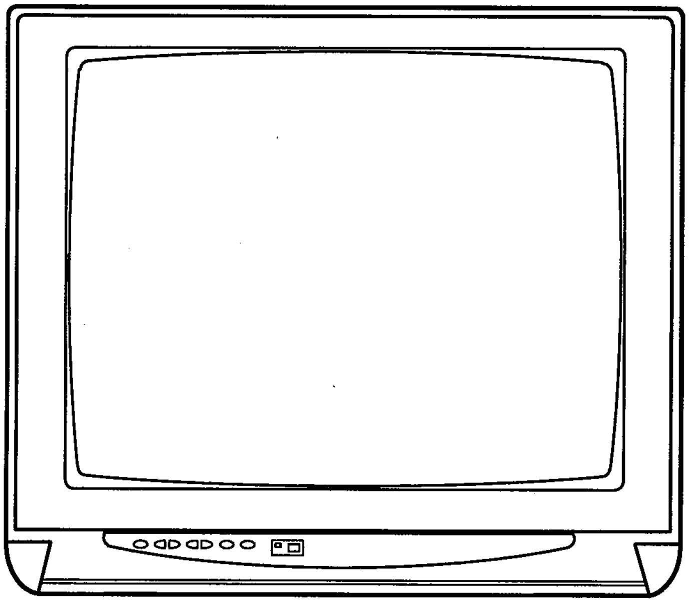
1967

ORDER NO. MTC9504600A1
B5

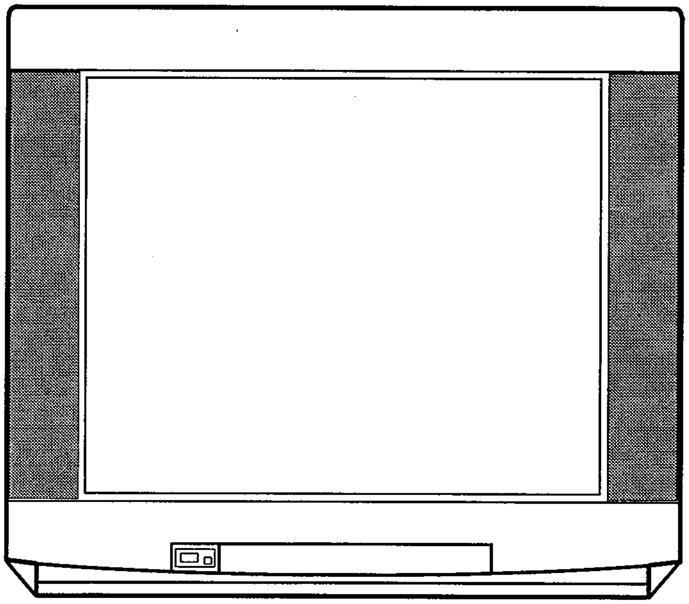
Service Manual



CT–27SF12T/1; CT27XF12CT; & CT–F29L7T/LT/VT

Color Television

Models	Chassis
CT–27SF12T	**AEDP248**
CT–27XF12CT	**AMEDP248**
CT–F29L7T,LT,VT	**AEDP248**
CT–2742SFT	**ALEDP248**



CT–2742SFT

Main Manual
(GL9C)

NOTE:
Models *CT–F29L7T/VT/LT* are identical to *CT–27SF12T* except for the magnetic field used in the factory to adjust ***purity*** and ***convergence*** for different markets.

The service technician is required to read and follow the "Safety Precautions" and "Important Safety Notice" in this manual.

Panasonic®

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Important Safety Notice

There are special components used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X–RADIATION, shock, fire or other hazards. Do not modify the original design without the permission of manufacturer.

Safety Precautions

General Guidelines

An ISOLATION TRANSFORMER should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

When servicing observe the original lead dress, especially in the high voltage circuit. In case of a short circuit, replace every part which has overheated.

Always REPLACE PROTECTIVE DEVICES, such as fishpaper, isolation resistors and capacitors and shields after working on the receiver. Use only manufacturers recommended rating for fuses, circuit breakers, etc.

High potentials are present when this set is operating. Operation of the set without the rear cover involves the danger of electric shock from the set's power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high–voltage equipment.

Extreme care should be used in HANDLING THE PICTURE TUBE. Rough handling may cause it to implode due to atmospheric pressure (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure in removal or installation. When handling, use safety goggles and heavy gloves for protection. Discharge picture tube by shorting the anode connection to chassis ground (not cabinet or other mounting parts). When discharging, go from ground to anode with a well insulated piece of wire.

Avoid prolonged exposure at close range to unshielded areas of the picture tube. Possible danger of personal injury from unnecessary exposure to X–ray radiation may result.

The TEST PICTURE TUBE used for servicing the chassis at the bench should incorporate a safety glass and magnetic shield. The safety glass affords shielding from the tube viewing area against X–ray radiation as well as implosion protection. The magnetic shield limits X–ray radiation around the bell of the picture tube in addition to restricting magnetic effects. When using a picture tube test jig for service, ensure that jig is capable of handling 31kV without causing X–radiation.

BEFORE RETURNING A SERVICED RECEIVER **(of any type)** TO THE OWNER, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock. DO NOT USE A LINE ISOLATION TRANSFORMER WHEN MAKING THIS TEST.

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and each exposed metallic part such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be infinite.

Leakage Current Hot Check (See Figure)

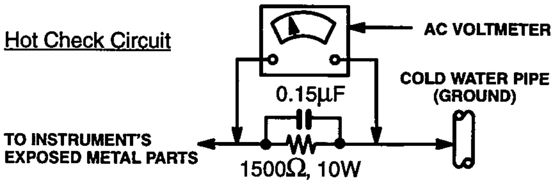
Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15µF capacitor between each exposed metallic part and ground. Use an earth ground, for example a water pipe.

Using an AC voltmeter with 1000 ohms/volt or more sensitivity, measure the potential across the resistor.

Move the resistor connection to each exposed metallic part and measure the voltage present.

Check that any potential does not exceed 0.75 volt RMS. A leakage current tester (Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above hot check, in which case any current measure must not exceed 1/2 milliamp. In case any measurement is out of the limits specified, there is a possibility of a shock hazard and the set must be repaired and rechecked before it is returned to the customer.


Hot Check Circuit

X–Radiation

WARNING: The potential source of X–radiation in TV sets is the High Voltage section and the picture tube.

NOTE: It is important to use an accurate, periodically calibrated high voltage meter.

Adjust BRIGHTNESS, PICTURE, SHARPNESS and COLOR controls to minimum.

Measure the High Voltage. The high voltage meter should indicate: 29.5kV ±1.25kV

If the upper meter indication is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Osc. Disable Circuit Test

This test must be made as a final check before the set is returned to the customer. See HORIZONTAL OSC. DISABLE CIRCUIT PROCEDURE CHECK in this manual.

Specifications

Specifications

Power Source:	120 volts, 60 Hz, AC
Power Consumption:	2.3 amps Max.
Antenna Terminal Impedance:	(1) UHF/VHF 75Ω input
Channel Capability:	181 Channels (Phase 18 DM Synthesizer)
Off the Air:	VHF 2~13, UHF 14~69
Cable:	125 Channels
(2) Video Input Jack:	1V p–p 75Ω, phono jack type
(2) Audio Input Jack (L & R):	500mV RMS, High impedance–10k
(1) S–Video Input:	S–Video (y – c) connector (rear)
Audio Out/Variable:	4.0V, RMS, 10k
Stereo Output Power:	10W x 10W (10% Distortion)
AI Sound:	Sound volume is regulated between programs and commercials to maintain a constant output level.
Comb Filter:	Separates video signal from chroma
Notch Filter:	Minimizes noise on the edges of colored images
Closed Caption Viewing:	Visual depiction of information contained in the audio portion of a television program.
English/Español Menus	On screen display (Model CT–27XF12CT English only)

Remote Control:	Easicon Universal Infra–red system (EUR501224)
Picture Tube:	27" diagonal (Viewing area) 110 degree deflection Super Flat Dark Face M68KTY161XF
Anode Voltage:	30.75kV Max. (Zero beam) 29.5kV ±1.25kV
Dimensions	(All models except **CT–2742SFT**) **Height** – 21–3/4" (552mm) **Width** – 26–3/16" (668mm) **Depth** – 18–13/16" (478mm) **Weight:** 84.0 lbs. (38 kg)
Dimensions:	(Model **CT–2742SFT**) **Height** – 22–3/64" (560 mm) **Width** – 27–1/2" (700 mm) **Depth** – 19–1/2" (496 mm) **Weight:** 89.01 lbs. (40.4 kg)

Specifications are subject to change without notice or obligation. Dimensions and weight are approximate measurements.

NOTE: Models CT–F29L7T,LT,VT are identical to CT–27SF12T except for the magnetic field used in the factory to adjust purity and convergence for different markets.

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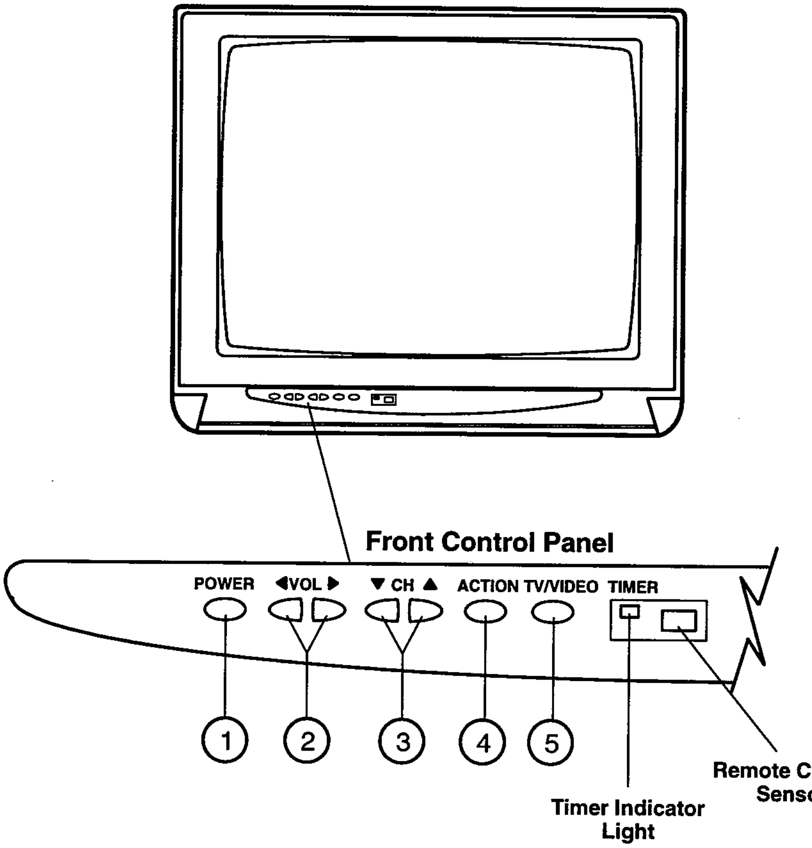
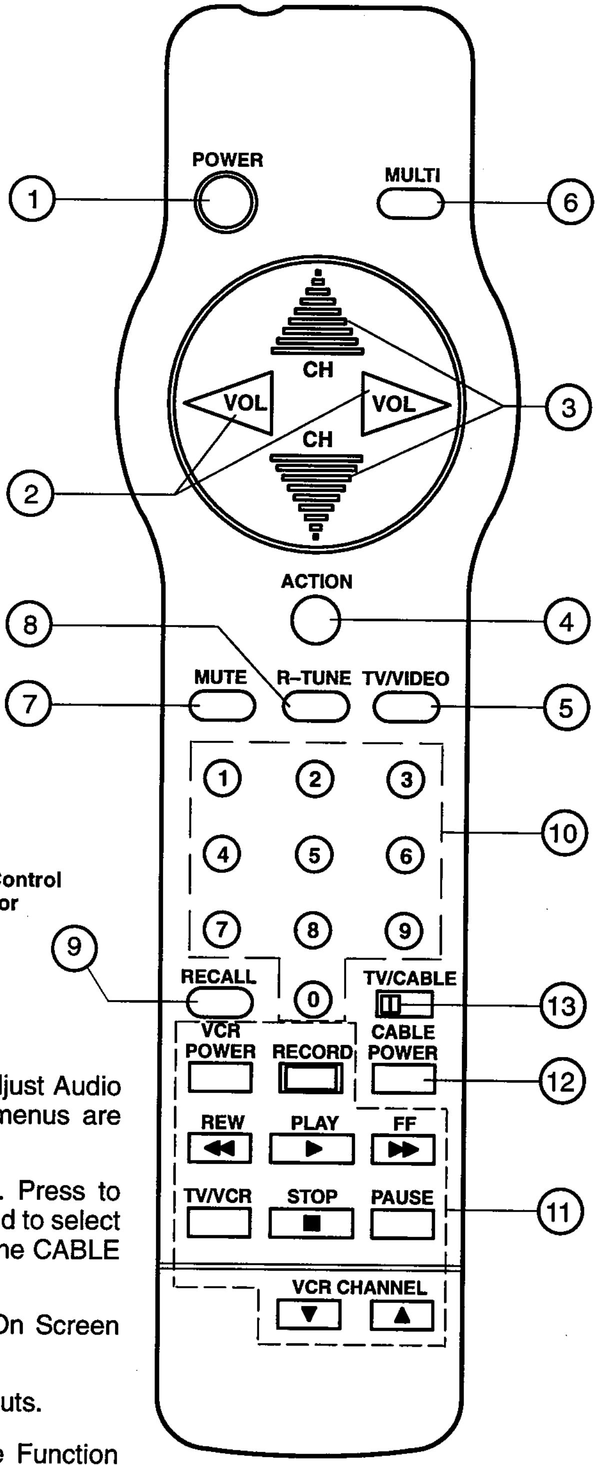
Followed by 6 Separate Large Pullout Schematic Sheets with All Schematics, Waveforms, Voltage Charts, Printed Wiring Boards & Audio/ Video Block Diagrams.

CT–27SF12T/1, CT–F29L7T,LT,VT Location of Controls





Remote Control

Quick Reference Control Operation

① **Power Button** – Press to turn ON or OFF.

② **Volume Buttons** – Press to adjust Sound Level. Press to adjust Audio Menus, Video Menus and select operating features when menus are displayed.

③ **Channel Buttons** – Press to select programmed channels. Press to highlight desired features when menus are displayed. Also used to select Cable Converter Box channels when TV/CABLE switch is in the CABLE position.

④ **Action Button** – Press to display Main Menu and access On Screen feature and Adjustment Menus.

⑤ **TV/Video Button** – Press to select TV or one of two Video Inputs.

⑥ **Multi Button** – Programmable to operate up to six Remote Function buttons.

⑦ **Mute Button** – Press to mute sound. A second press returns sound.

⑧ **R–Tune (Rapid Tune) Button** – Press to switch between two channels.

⑨ **Recall Button** – Press to display Time, status of Sleep Timer, Channel, Video Mode, Channel Caption and Audio Mode.

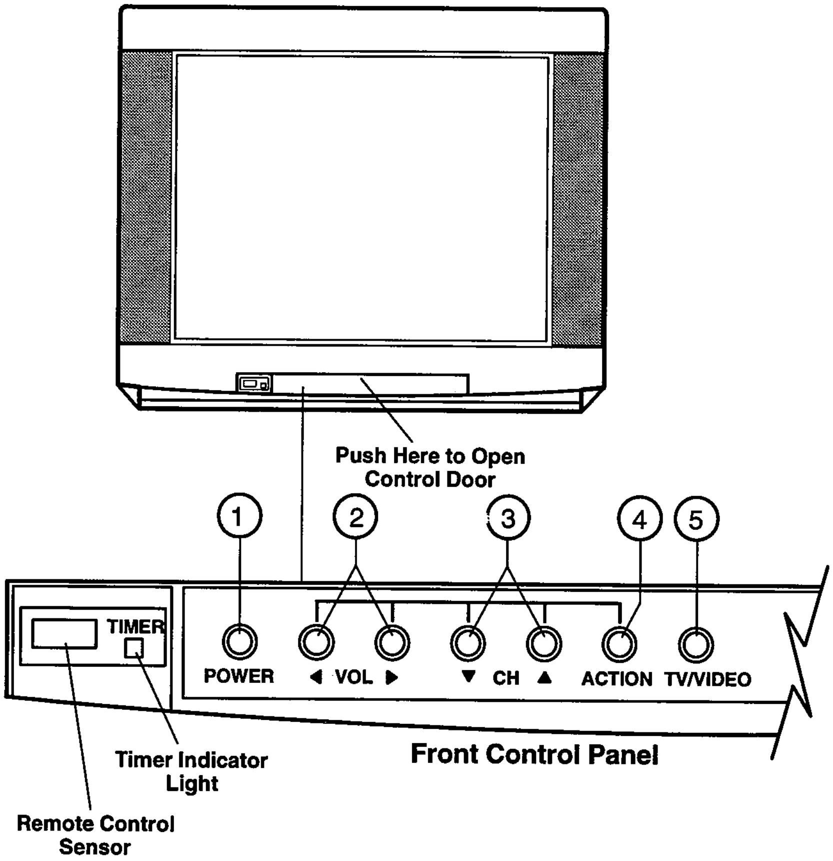
⑩ **Keyboard "0 through 9" Buttons** – Press desired channel number to access any channel.

⑪ **VCR Function Buttons** – Programmable to operate many brands of VCRs.

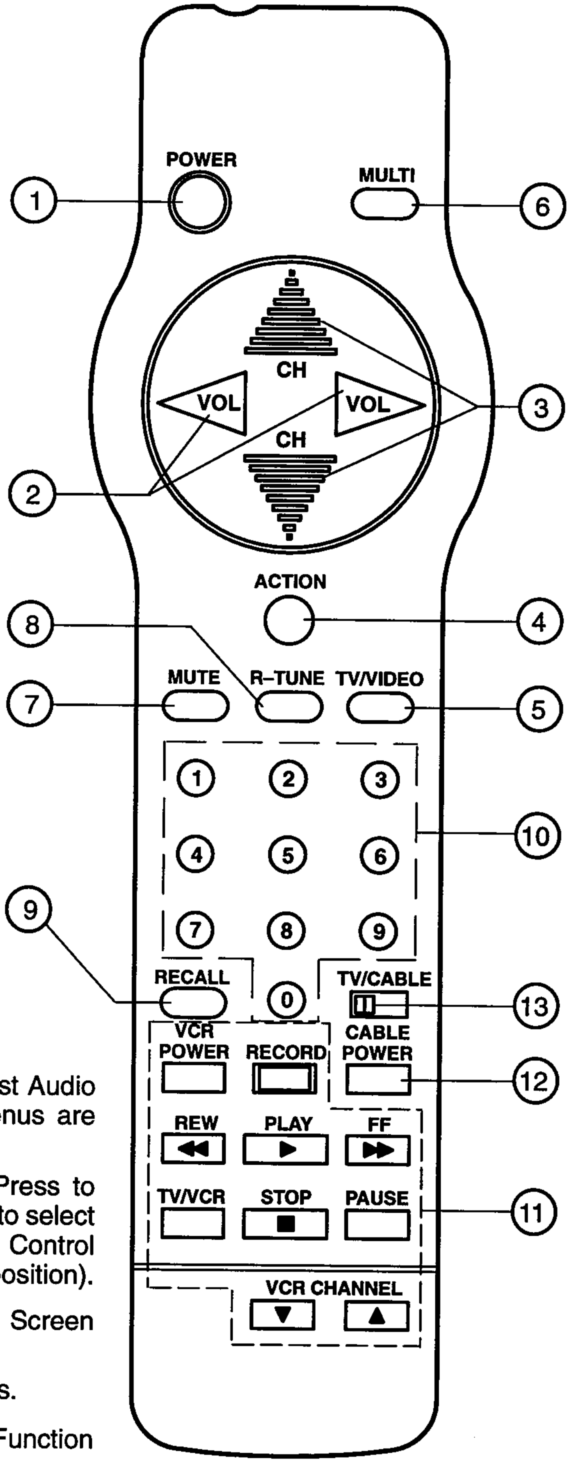
⑫ **Cable Power Button** – Programmable to operate selected CATV converter boxes.

⑬ **TV/CABLE Switch** – This switch is used to select the proper mode when programming Remote Control Infra–Red codes or operating the TV or Cable Converter box.

CT–2742SFT
Location of Controls



Front Control Panel



Remote Control

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③ **Channel Buttons** – Press to select programmed channels. Press to highlight desired features when menus are displayed. Also used to select Cable Converter Box channels after programming Remote Control Infra–red codes (the TV/CABLE switch must be set in the Cable position).

④ **Action Button** – Press to display Main Menu and access On Screen feature and Adjustment Menus.

⑤ **TV/Video Button** – Press to select TV or one of two Video Inputs.

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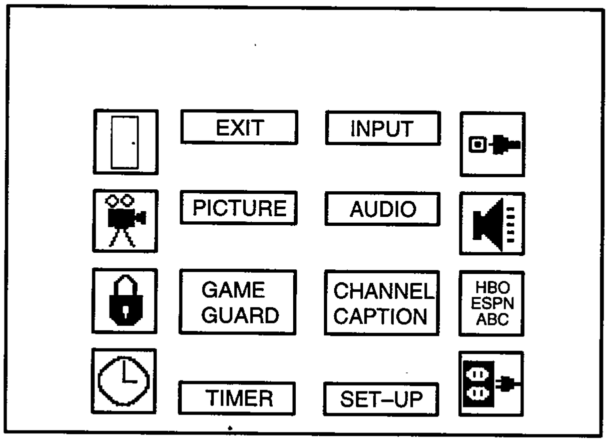
⑪ **VCR Function Buttons** – Programmable to operate many brands of VCRs (TV/CABLE switch must be in the TV position).

⑫ **Cable Power Button** – Programmable to operate selected CATV converter boxes.

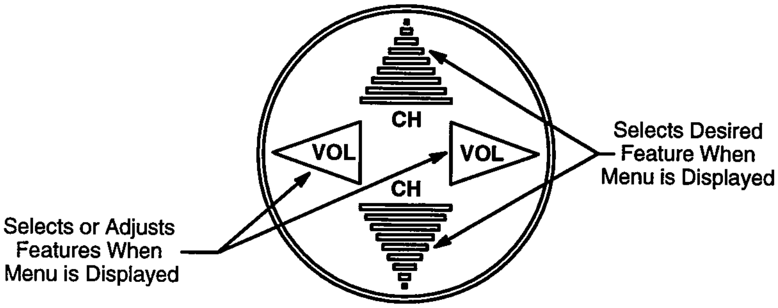
⑬ **TV/CABLE Switch** – This switch is used to select the proper mode when programming Remote Control Infra–Red codes or operating the TV or Cable Converter box.

Main Menu (Icons)



Located On Remote Control

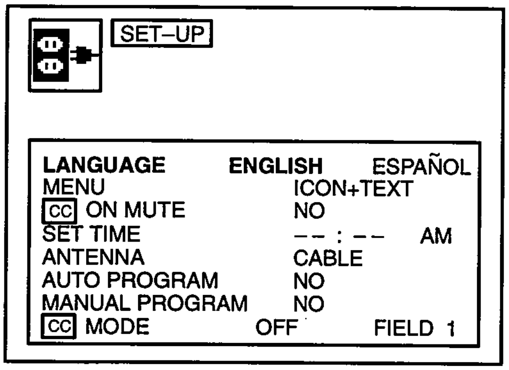
Displays and Exits Menus


CH
VOL
VOL
CH
Selects Desired Feature When Menu is Displayed
Selects or Adjusts Features When Menu is Displayed

1. Press the ACTION button to display the Main Menu with Icons.
2. Press the CH UP or DOWN and the VOL LEFT or RIGHT buttons to select the desired Icon when the Main Menu is displayed (selected Icon will be indicated in Red).
3. Press the VOL buttons for left and right movement and the CH buttons for up or down movement.
4. To exit the Main Menu first select the EXIT Icon, then press the ACTION button.

The Language Menu is factory set to ENGLISH. Follow these instructions to change the Language Menu to Spanish and back to English (not used in CT–27XF12CT and CT–2742SFT).

1. Press the ACTION button to display the Main Menu.
2. Press the CH DOWN and VOL RIGHT buttons to select the SET–UP Icon.



LANGUAGE **ENGLISH** ESPAÑOL
MENU ICON+TEXT
CC ON MUTE NO
SET TIME -- : -- AM
ANTENNA CABLE
AUTO PROGRAM NO
MANUAL PROGRAM NO
CC MODE OFF FIELD 1

3. Press the ACTION button to display the SET–UP Menu.
4. Press the CH UP or DOWN button to select "LANGUAGE". (If necessary)
5. Press the VOL LEFT or RIGHT button to highlight ENGLISH or ESPANOL.
6. Press the ACTION button twice to exit SET–UP Menu.

Programming The Universal Remote Control

VCR

Preferred Procedure – Code Known

Programming Universal Remote Using Infra–Red Access Codes for VCRs

- Determine brand of VCR.
- Identify code(s) associated with the brand in the infra–red code index for VCRs (located in this manual).

Procedure

1. Place the Remote TV/CABLE switch into the TV position (Left). **TV/CABLE**
2. Press and hold VCR POWER button down on Universal Remote. **VCR POWER**
3. Enter two digit code using keyboard "0 through 9" buttons. The Universal Remote is now programmed.

NOTE: Some brands have multiple codes. Repeat procedure using each code listed until VCR responds correctly.

Alternate Procedure – Code Unknown

Programming Universal Remote Using the "Sequence Method" for VCRs

- Confirm VCR is plugged in and operating properly, then turn OFF.

Procedure

1. Place the Remote TV/CABLE switch into the TV position (Left).
2. Press and hold the VCR POWER button down on Universal Remote.
3. Press VOL RIGHT button repeatedly. Check for the VCR to turn ON after each press. Stop pressing the button when the VCR turns ON. The proper infra–red code has now been accessed.

NOTE:

1. It may take several attempts before the correct code is found.
2. The VOL LEFT button can be used to return to a code that was accidently passed by.
3. Some Remote Controls may have unique operating functions for some buttons. For Example: The POWER button may only turn the VCR OFF as opposed to both ON and OFF. It will then be necessary to modify the procedure. Turn the VCR ON and repeatedly press the VOL RIGHT button until the VCR turns OFF.

Cable Converter Box

Preferred Procedure – Code Known

Programming Universal Remote Using Infra–Red Access Codes for Cable Television Converter Boxes

- Determine brand of Cable Television Converter box.
- Identify code(s) associated with the brand in the infra–red code index for Cable Television Converter boxes (located in this manual).

Procedure

1. Place the Remote TV/CABLE switch into the CABLE position (Right). **TV/CABLE**
2. Press and hold the CABLE POWER button down on Universal Remote. **CABLE POWER**
3. Enter two digit code using keyboard "0 through 9" buttons. Release CABLE power button. The Universal Remote is now programmed. **Use the Remote CHANNEL UP/DOWN buttons for selecting Cable Converter Box channels.**

NOTE: Some brands have multiple codes. Repeat procedure using each code listed until Cable Television Converter box responds correctly.

Alternate Procedure – Code Unknown

Programming Universal Remote Using the "Sequence Method" for Cable Television Converter Boxes

- Confirm Cable Television Converter box is plugged in and operating properly, then turn OFF.

Procedure

1. Place the Remote TV/CABLE switch into the CABLE position (Right).
2. Press and hold the CABLE POWER button down on Universal Remote.
3. Press VOL RIGHT button repeatedly. Check for the Cable Television Converter box to turn ON after each press. When the Cable Television Converter box turns ON, release Cable Power button. The proper infra–red code has now been accessed.

NOTE:

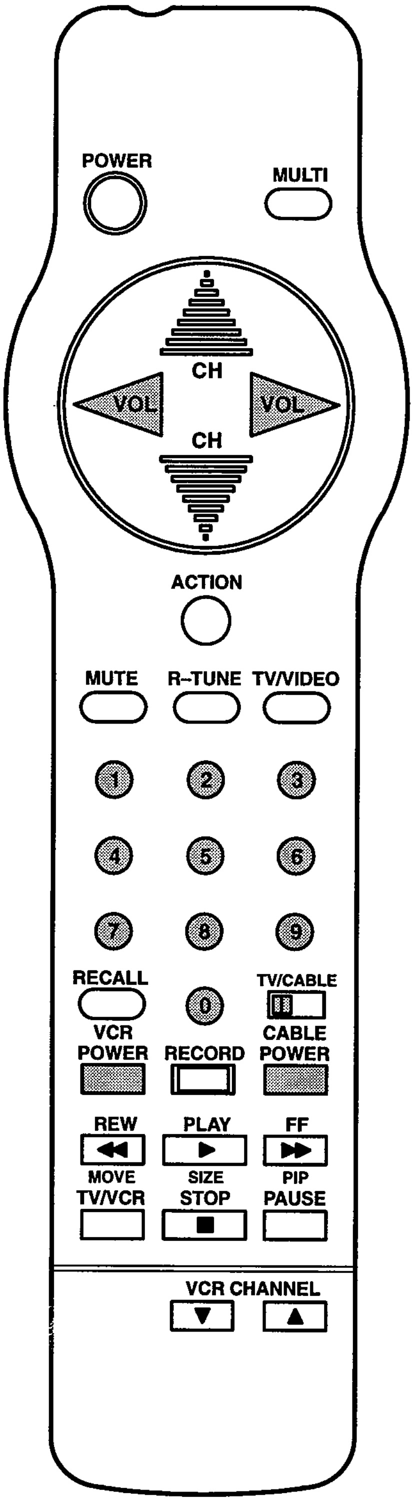
- It may take several attempts before the correct code is found.
- The VOL LEFT button can be used to return to a code that was accidently passed by.
- Some Remote Controls may have unique operating functions for some buttons. For Example: The POWER button may only turn the Cable Television Converter box OFF as opposed to both ON and OFF. It will then be necessary to modify the procedure. Turn the Cable Television Converter box ON and repeatedly press the VOL RIGHT button until the Cable Television Converter box turns OFF.

NOTE: When operating equipment (TV, VCR or Cable Converter box) with the Universal Remote Control, the TV/CABLE switch should be set to the same position where the Access Code was first programmed for the equipment. Otherwise, leave the switch in the TV position.

VCR and Cable Converter Box Infra–Red Codes Index

The Universal infra–red Remote Control is capable of operating many brands of VCRs and Cable Television Converter Boxes after entering the proper infra–red code.

NOTE: The Universal Remote Control memory is limited. Some models of VCRs or Cable Television Converter Boxes may not operate. The Universal Remote Control is not designed to control all features that are available in all models.



Remote Control

Infra–Red Code Index For VCRs

VCR Brand	Code(s)	VCR Brand	Code(s)
Audio Dynamics	14, 16	NEC	02, 14, 16, 30
Broksonic	10	Panasonic	00, 01
Canon	00, 01	Pentax	05
Capehart	01	Philco	00, 29
Citizen	09	Philips	00, 29
Craig	12	Pioneer	05
Curtis Mathes	00, 08, 15	Quasar	00, 01
DBX	14, 16	RCA	05, 07, 08, 28, 35
Emerson	10, 20, 34, 35, 36, 37	Realistic	00, 02, 06, 12, 15
Fisher	12, 18, 19	Samsung	07, 32
Funai	15	Sanyo	02, 12
GE	00, 07, 08, 32	Scott	04, 13, 33, 36
Goldstar	09	Sears	02, 05, 18, 19
Hitachi	05, 35, 36	Sharp	06, 24
Instant Replay	00	Sony	17, 26, 33, 34
JC Penney	00, 02, 05, 14, 16, 30	Sylvania	00, 29
JVC	02, 14, 16, 30	Symphonic	15
Kenwood	02, 14, 16, 30	Tashiko	09
Magnavox	00, 29	Tatung	30
Marantz	02, 14, 16, 29, 30	Teac	15, 30
Marta	09	Teknika	21
Memorex	00, 12	Toshiba	05, 13
MGA	04, 27	Vector Research	14, 16
Minolta	05	Video Concepts	14, 16
Mitsubishi	04, 27	Wards	06
Montgomery Ward	06	Yamaha	02, 14, 16, 30
Multitech	07, 15, 32	Zenith	11, 17

Infra–Red Code Index For Cable Television Converter Box

Brand of Cable–TV Box	Code(s)	Brand of Cable–TV Box	Code(s)
G.I.	04, 05, 15, 23, 24, 25, 30, 36	Pioneer	18, 20
Hamlin	12, 13, 34	RCA	27
Jerrold	04, 05, 15, 23, 24, 25, 30, 36	Regency	02
Macom	27	Scientific Atlantic	03, 22
Magnavox	19, 26, 28, 29, 32, 33, 40, 41	Sylvania	11
Oak	14,16, 18	Texscan	10, 11
Oak Sigma	16	Tocom	17, 21
Panasonic	27, 39	Unika	31
Philips	19, 26, 28, 29, 32, 33, 40, 41	Viewstar	19, 26, 28, 29, 32, 33, 40, 41
		Zenith	01, 42

Disassembly For Service

Back Cover

Remove all screws indicated by ⬅ on back of set.

1. 5 screws around perimeter of cabinet.
2. 2 screws by A/V jacks. (3 screws in CT–2742SFT)
3. 1 screw by AC line cord.

Main Chassis (A–Board with N, X Boards) P–Board

The N and X–Boards are part of the Main chassis (A–Board). When servicing these boards, extension cables may be required. Cables are supplied as a kit from Matsushita Services Company, Part No. TXAZS011SER. The A–Board rests in a chassis tray along with the P–Board (Power Supply).

1. Slide chassis tray out. Gently lift tray and pull out. Disconnect plug connectors; release wire ties and holders as required for complete chassis removal.
    a.) The A–Board is secured to the chassis tray with 8 screws.
    b.) The P–Board is secured to the chassis tray with 6 screws.

C–Board – CRT Output

1. Plugs into socket on CRT neck.

K–Board – Keyboard (CT–2742SFT only)

1. Secured to the cabinet escutcheon under the CRT by 2 screws.

L–Board – Remote Receiver and Timer LED (CT–2742SFT only)

1. Secured to the cabinet escutcheon under the CRT by 1 screw.

L–Board – Keyboard, Remote Receiver and Timer LED (all other models)

1. Secured to the cabinet escutcheon under the CRT by 3 screws.

N–Board – VIF/SIF & MTS Decoder

1. Solder to the A–Board at A21 and A22 connectors.

X–Board – AV1/AV2 Jacks, S–Video Connector, A/V Switch, S–Video Switch Comb Filter and To Audio AMP Jacks

1. Plugs into A–Board A1 & A2 connectors.

Note: Small screwdriver must be used to release connector locking tabs.

2. Secured by a plastic mounting bracket. (Press tab and pull board upwards after releasing.)

R & L Speaker Modules

1. 2 screws secure each speaker module.
2. Press top and bottom tabs and pull out modules.

R & L Speaker

1. 4 screws secure each speaker to the speaker modules.

Disassembly for CRT Replacement

1. Discharge CRT as instructed in SAFETY PRECAUTIONS and remove 2nd anode button from CRT.
2. Remove Speaker Modules (L & R).
3. Disconnect connectors:
    A–Board = A19, A26, Yoke (DY) and A17 single black wire (in some models)
    CRT–Board = Black dag ground C11.
    P–Board = Degauss coil (Deg)
4. Perform complete removal of Main chassis, Power Supply (P–Board) and CRT–Board AS INSTRUCTED IN DISASSEMBLY FOR SERVICE PROCEDURE.

CRT Replacement

1. Perform DISASSEMBLY FOR CRT REPLACEMENT procedure.
2. Insure CRT H.V. anode button is discharged before handling CRT. See SAFETY PRECAUTIONS on handling the picture tube.
3. Remove remaining components on CRT neck and place cabinet face down on a soft pad.
4. Remove CRT mounting screws from each corner. Remove CRT with degaussing coil and dag ground braid attached.
5. Remove degaussing coil from clampers at each corner of the CRT. (Note original location and mounting of degaussing coil assembly to insure proper re–installation on the replacement CRT).
6. Remove dag ground braid by unhooking coil spring from lower left CRT mounting ear and releasing braid ends from upper left CRT mounting ear and lower right mounting ear.
7. Mount dag ground braid on replacement CRT.
8. Snap on new degaussing coil clampers to each corner mounting ear of replacement CRT and replace degaussing coil. Make sure coil fastens to all clamps. Dress coil as originally installed.

NOTE: Degaussing coil must be dressed 2” away from deflection yoke.

9. Mount Replacement CRT into cabinet.
10. Replace components on CRT neck and re–install chassis into cabinet. Make sure all plugs get connected. (Step no.3: DISASSEMBLY FOR CRT REPLACEMENT.)

Purity and Convergence Procedure

Adjustment should be necessary only if the CRT or deflection yoke is replaced or if someone has disturbed the setting. The complete procedure consists of:

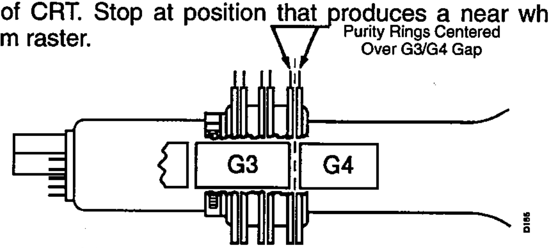
1. Initial static convergence
2. Setting purity
3. Final static convergence

When CRT or Yoke is Replaced

Place the yoke on the CRT neck (do not tighten clamp).

Position purity/convergence assembly as shown and tighten clamp snugly. Cut hot–melt glue seal on assembly and place like tabs of purity device together at 12 o'clock to reduce its magnetic field effect. Manually degauss CRT.

Turn Receiver ON and slide deflection yoke back and forth on neck of CRT. Stop at position that produces a near white, uniform raster.



Positioning of Purity/Convergence Assembly

Initial Center Static Convergence

Connect dot/crosshatch generator to Receiver and tune in signal. Observe misconvergence at center of screen only.

Adjust 4 pole magnet (center rings): separate tabs and rotate device to converge blue with red.

Adjust 6 pole magnet (rear rings): separate tabs and rotate device to converge blue and red (magenta) with green.
NOTE: Precise convergence at this point is not important.

Purity Adjustment

Enter Serviceman Mode for making electronic adjustments, Press the Remote Control (RECALL) button to enter Purity Check. **See Flow Chart for Serviceman Mode.**

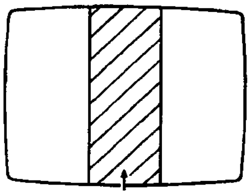
Operate the Receiver for 60 minutes using the first Purity check field (white screen) to stabilize the CRT.

Degauss the Receiver fully by using an external degaussing coil.

Press the Remote Control (RECALL) button again until the Purity Check (green screen) appears.

Loosen the deflection yoke clamp screw and move the deflection yoke back as close to the purity magnet as possible.

Adjust the front rings to set the vertical green raster precisely at the center of the screen. (Shown below.)



Green Raster

Slowly move the deflection yoke forward and adjust for the best overall green screen.

Tighten the deflection yoke clamp screw.

Press the Remote Control (RECALL) button again until the Purity Check (blue screen) and (red screen) appear and observe that good purity is obtained on each respective field.

Press the Remote Control (RECALL) button again until Purity check (white screen) appears. Observe the screen for uniform white. If not, repeat above procedure.

Exit Serviceman Mode (See Flow Chart for Serviceman Mode.)

Final Convergence Procedure

NOTE: Before attempting convergence adjustment, vertical size, pincushion and focus adjustments must be completed. Connect a dot pattern generator to the set. The brightness level should be no higher than necessary to obtain a clear pattern.

Converge the red and blue dots at the center of the screen by rotating the 4 pole (R with B) Static Convergence Magnets.

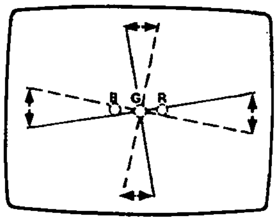
Align the converged red/blue dots with the green dots at the center of the screen by rotating the 6 pole (R/B with G) Static Convergence Magnets. Melt wax with soldering pencil to reseal magnets.

Slightly tilt (do not rotate) the deflection yoke vertically and horizontally to obtain good overall convergence.

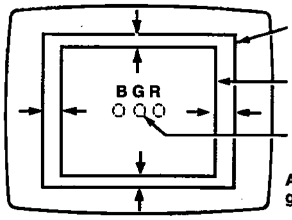
After vertical adjustment of the yoke, insert wedge at 11 o'clock position, then make the horizontal tilt adjustment.

Secure deflection yoke by inserting side two wedges at 3 and 7 o'clock positions.

Apply adhesive between tab (thin portion) of wedge and CRT and place tape over tab to secure to CRT.



As the yoke is moved vertically, the rasters produced by the outside guns rotate in opposite directions.

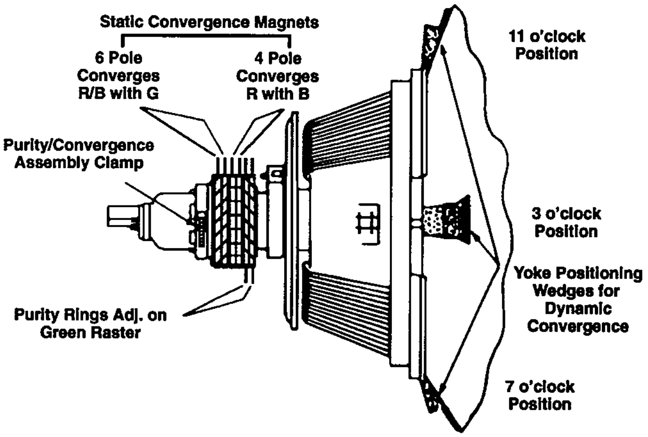


Raster produced from one of the outside electron beams

Raster from the other outside electron beam

Static convergence magnets are set for center convergence

As the yoke is moved horizontally, one raster gets larger while the other gets smaller


Static Convergence Magnets
6 Pole Converges R/B with G
4 Pole Converges R with B
Purity/Convergence Assembly Clamp
Purity Rings Adj. on Green Raster
11 o'clock Position
3 o'clock Position
Yoke Positioning Wedges for Dynamic Convergence
7 o'clock Position

Permalloy Convergence Corrector Strip (Part No. OFMK014ZZ)

This strip is used in some sets to match the yoke and CRT for optimum convergence. If the yoke or CRT is replaced, the strip may not be required.

First converge the set without the strip and observe the corners.

If correction is needed:

1. Place strip between CRT and yoke, in quadrant needing correction. Slowly move it around for desired results.
2. Press adhesive tightly to the CRT and secure with tape.

Service Notes

IMPORTANT: To protect against possible damage to solid state devices due to arcing or static discharge, make certain all ground wires and CRT DAG wire are securely connected.

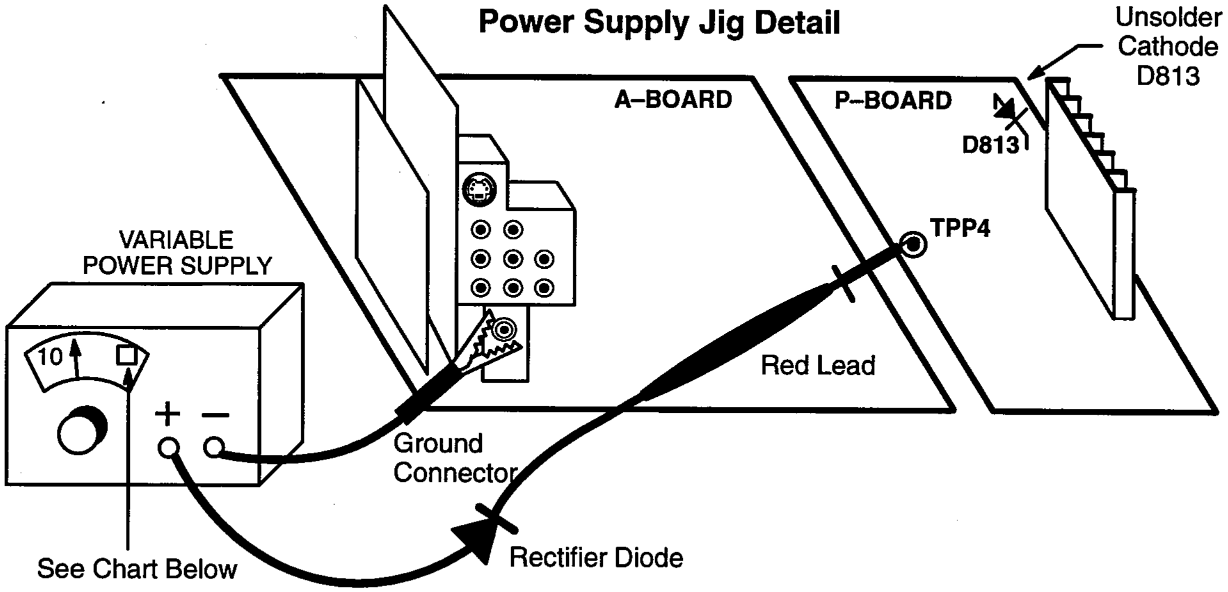
CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing to avoid damage to test equipment or chassis. Connect test equipment to correct ground (⏚) or (⊥) when servicing or incorrect readings will occur.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X–radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X–radiation and shock and fire hazard, the parts indicated by ⚠ symbol on the schematic must be replaced with identical replacement parts. Order parts from the manufacturers parts center using numbers shown in this service manual or give complete chassis number and part reference number.

For optimum performance and reliability, all other parts should be replaced with components having identical specifications.

Power Supply Jig Detail



Horiz Osc Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage. If for any reason, the high voltage exceeds a predetermined amount, this circuit operates and detunes the horizontal oscillator. This limits high voltage.

The over–voltage protection circuit is not adjustable. However, if components are indicated by ⚠ symbol on the schematic in either the horizontal sweep system or the over voltage protection circuit itself are changed, the operation of the circuit should be checked using the following procedure.

Equipment

1. HIGH VOLTAGE meter (0V–50KV)
2. VARIABLE DC POWER SUPPLY

   10 ~ 20Volts (Max.), 1 AMP
3. A rectifier diode
4. Long red lead with easy hook–up probe
5. Black lead with alligator clip

Preparation

1. Connect Receiver to AC 120 Volts.
2. Turn Receiver ON. Tune in a station to verify horizontal is in sync.
3. Turn Receiver OFF. Connect HIGH VOLTAGE meter to 2nd anode (HV button). **NOTE:** use cold ground (⊥) for negative lead.
4. Unsolder cathode lead of (D813 on P–Board).
5. Connect Power Supply jig as shown in detail. Turn Power Supply ON and adjust voltage to zero (0V).

Procedure

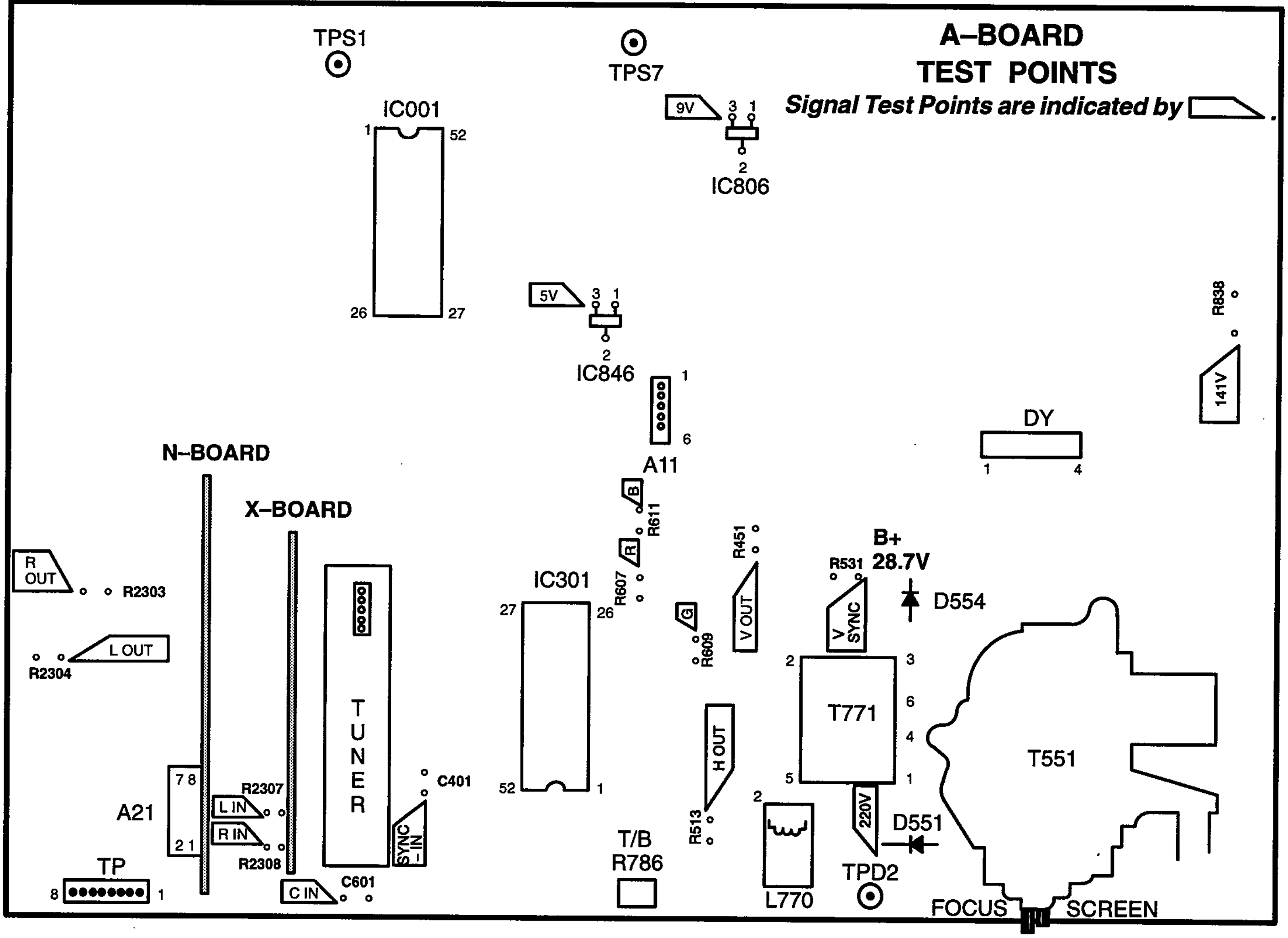
1. Turn Receiver ON. Select an active channel with low white (highlights) content.
2. Set AUTOCOLOR of Picture Menu to OFF. (when applicable)
3. Adjust VIDEO Controls of Picture Menu:
- COLOR to Min.
- PICTURE and BRIGHT so picture is just visible. Adjust Serviceman DAC Sub Bright (B2) if necessary for just visible picture. (Make note of original value)

4. Slowly increase Power Supply voltage from 0V to Max. (Shown in chart) until horizontal just begins to pull out of sync. (Confirm that PIP picture disappears before Main Picture horizontal sync is disabled.)
5. Observe the High Voltage meter. HIGH VOLTAGE should read less than: 37.0kV.
6. Slowly reduce Power Supply Voltage to zero (0V). Turn OFF Power Supply. Turn OFF Receiver.
7. Resolder D813 on P–Board. Disconnect Power Supply jig.
8. Turn set on. Confirm B+ 141V with 120V AC applied. Reset Serviceman DAC Sub Bright (B2) to original value. Noted in step No. 3.

IF HIGH VOLTAGE IS NOT WITHIN THE SPECIFIED LIMIT, THE CAUSE MUST BE DETERMINED BEFORE THE RECEIVER IS RETURNED TO THE OWNER.

Service Adjustment Procedures

ALL SERVICE ADJUSTMENTS ARE FACTORY PRESET AND SHOULD NOT REQUIRE ADJUSTMENT UNLESS CONTROL AND/OR ASSOCIATED COMPONENTS ARE REPLACED.

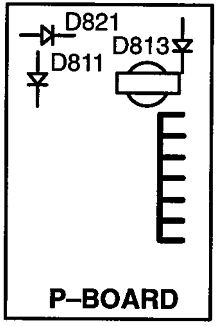


A–BOARD TEST POINTS

Signal Test Points are indicated by ▭.

141V B+ Voltage Confirmation

1. Adjust BRIGHT, PICTURE and COLOR Video controls of PICTURE Menu Icon to Minimum.
   Select AUTOCOLOR "OFF".
2. Connect a DVM between D811 cathode (P–Board) and cold ground (⏚).
3. Confirm that B+ voltage is 141.2V(±1.6V).



Source Voltage Chart

120V AC line input. BRIGHT and PICTURE of Picture Menu Icon to Minimum. AUTOCOLOR OFF. Use cold ground (⏚) for minus lead of DVM.

IC846 pin 3 (A–Board)	+5.0V(±1V)
IC803 pin 3 (A–Board)	+9.0V(±1V)
D821 Cathode (P–Board)	+12.2V(±1.5V)
D813 Cathode (P–Board)	+18.0V(±1.5V)
D554 Cathode (A–Board)	+28.7V(±1.5V)
D551 Cathode (A–Board)	+230.0V(±15V)

B+ Resistance (+ Lead to Ground ⏚)

NOTE: Receiver Power "OFF"

B+	CONNECTION POINT	RESISTANCE
+5V	TPA82	50Ω or more
+9V	TPA81	50Ω or more
+12V	TPP84	50Ω or more
+18V	TPP85	500Ω or more
+28.7V	TPA83	1KΩ or more
+141.2V	TPP86	10KΩ or more
+230V	TPH2	50KΩ or more

High Voltage Check

1. Select an active TV channel and confirm that horizontal is in sync.
2. Confirm B+ 141.2V is within limit.
3. Adjust BRIGHT and PICTURE Video Controls of PICTURE Icon menu to Minimum.
4. Select AUTOCOLOR of PICTURE Icon menu for "OFF".
5. Using a calibrated high voltage meter confirm that High Voltage is 29.5kV (±1.25kV)

Serviceman Mode (Electronic Controls)

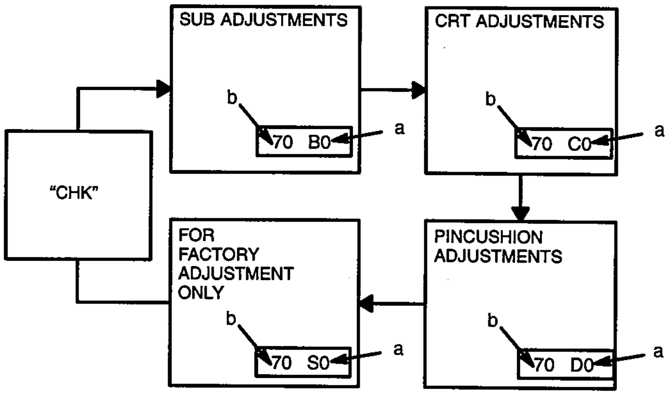
This chassis has new electronic technology using the I^{2}C Bus Concept. The system usually performs as a control function and replaces many of the required mechanical controls. Instead of adjusting various mechanical controls individually, many of the control functions are now performed electronically by using "On Screen Menu". (The Serviceman Adjustment Mode.)

NOTE: It is suggested that a serviceman read all the way through and understand the following procedure for Entering/Exiting the Serviceman Adjustment Mode; then proceed to follow the instructions working with the Receiver. After a person is familiar with this adjustment procedure, use the Instructional Flow Chart for Serviceman Mode as a quick guide.

Entering Serviceman Mode:

1. While the Receiver is ON and operating in Normal Mode, momentarily short connector test pin TP–8 (schematic reference FA1) to ground (⏚) TP–3 (schematic reference FA2) on A–Board.
   "The Receiver enters the Aging Mode".
   A yellow on–screen "CHK" will appear in upper left of picture screen.
   (The VOLUME UP/DOWN will adjust rapidly.)
2. **Press** ACTION button and VOLUME UP button on Receiver Control Panel simultaneously.
   "The Receiver enters the Servicemans Mode".
   The yellow on–screen "CHK" will turn Red.
   (The VOLUME UP/DOWN will adjust normally.)
   (All customer controls are set to a nominal level.)
3. **Press** the POWER button on the Remote Control to select one of five Serviceman Adjustment Modes.
   - B = Serviceman SUB ADJUSTMENTS
   - C = Serviceman CRT ADJUSTMENTS
   - D = Serviceman Pincushion ADJUSTMENTS
   - S = Factory ADJUSTMENTS only
   - "CHK" mode = Normal operation of Channel ▲▼ and Volume ▲▼

ADJUSTMENT MODE DETAILS



For Sub Adjustments:

a.) Press
CHANNEL UP/DOWN Triangle buttons on the Remote Control to select any of 6 Service Sub Adjustment Addresses. (a in detail)

Important Note: Write down the original value (b in detail) for each address adjustment before adjusting anything. It is easy to adjust the wrong item.

BO = Sub Color
B1 = Sub Tint
B2 = Sub Brightness
B3 = Sub Contrast
B4 = RF AGC

b.) Press
VOLUME LEFT/RIGHT Triangle buttons on the Remote Control to adjust the level of the selected Service Adjustment.

Adjustment Range and Default level values for Service Adj.

Service Adjustment	Adj Range	Default Level
Sub Color (BO)	0 ~ 63	32
Sub Tint (B1)	0 ~ 63	32
Sub Brightness (B2)	0 ~ 192	96
Sub Contrast (B3)	0 ~ 63	32
RF AGC (B4)	0 ~ 127	64

Press the POWER button on the Remote Control to select Serviceman CRT Adjustment Mode.

For CRT Adjustments:

a.) Press
CHANNEL UP/DOWN Triangle buttons on the Remote Control to select any of Service Adjustment Addresses (a in detail).

Important Note: Write down the original value (b in detail) for each address adjustment before adjusting anything. It is easy to adjust the wrong item.

CO = Red Cutoff (Low Light)
C1 = Grn Cutoff (Low Light)
C2 = Blu Cutoff (Low Light)
* C3 = Brightness
† C4 = Sub Bright
C5 = Red Drive (High Light)
C6 = Blu Drive (High Light)

b.) Press
VOLUME LEFT/RIGHT Triangle buttons on the Remote Control to adjust the level of the selected Service Adjustment (b in detail).

Adjustment Range and Default level values for Service Adj.

CRT Adjustment	Adj Range	Default Level
RED Cutoff (C0)	3 x 0 ~ 256	2 020
GRN Cutoff (C1)	0 ~ 256	128
BLU Cutoff (C2)	3 x 0 ~ 256	2 020
* Brightness (C3)	0 ~ 63	–
† Sub Bright (C4)	0 ~ 192	–
RED Drive (C5)	0 ~ 256	128
BLU Drive (C6)	0 ~ 256	128

*User set adjustment – same as customer menu adjustment for Brightness.

† Same as Sub Adjustment DAC Sub Brightness (B2).

Press the POWER button on the Remote Control to select Serviceman Pincushion Adjustment Mode.

For Pincushion Adjustments:

a.) Press
CHANNEL UP/DOWN Triangle buttons on the Remote Control to select any of 12 Service Adjustment Addresses. (a in detail)

Important Note: Write down the original value (b in detail) for each address adjustment before adjusting anything. It is easy to adjust the wrong item.

DO = Vert Size
D1 = Vert Linearity
D2 = Vert S Correct
D3 = Horiz Size
D4 = Horiz Centering
D5 = E–W Parabola
D6 = Vert Keystone
D7 = E–W Top Corner
D8 = E–W Bottom Corner
D9 = EHT Vert Compression
Da = EHT Horiz Compression
Db = Vert Centering

b.) Press
VOLUME LEFT/RIGHT Triangle button on the Remote Control to adjust the level of the selected Service Adjustment. (b in detail)

Adjustment Range and Default level values for Service Adj.

Service Adjustment	Adj Range	Default Level
Vert Size (D0)	0 ~127	87
Vert Linearity (D1)	0 ~ 63	34
Vert S Correction (D2)	0 ~ 63	14
Horiz Size (D3)	0 ~ 63	40
Horiz Center (D4)	0 ~ 31	16
E–W Parabola (D5)	0 ~ 63	24
Vert Keystone (D6)	0 ~ 63	34
E–W Top Corner (D7)	0 ~ 15	08
E–W Bottom Corner (D8)	0 ~ 15	08
EHT Vert Compression (D9)	0 ~ 15	08
EHT Horiz Compression (Da)	0 ~ 15	08
Vert Position (Db)	0 ~ 63	32

Press the Power button on the Remote Control to select the next Serviceman Mode.

Factory Adjustments: S0~Se

The Factory Adjustments can be entered but no adjustments should be made by servicemen. **This is for factory set up only.**
Write the original value for each address in case one of these adjustments is changed by mistake. Confirm that values are as shown for default.

Default Setting Position	
S0 = 03	S8 = 04
S1 = 10	S9 = 05
S2 = 15	Sa = 36
S3 = 15	Sb = 00
S4 = 07	Sc = 36
S5 = 12	Sd = 109
S6 = 23	Se = 00
S7 = 01	

Press the Power button on the Remote Control to select the "CHK" Normal TV Mode.

To Check Purity:

Press the RECALL button on the Remote Control to enter Purity Field Check Mode.

WHITE SCREEN → RED SCREEN → GRN SCREEN → BLU SCREEN → NORMAL SCREEN

Press Recall again to select desired Field

IMPORTANT NOTE:
Always Exit Serviceman Mode After Use.
Exit Serviceman Mode:

1. Press ACTION + POWER buttons simultaneously for approximately 2 seconds.
   "The Receiver exits Serviceman Mode".

The Receiver momentarily shuts off; then comes back on tuned to channel 3 with a preset level of sound.

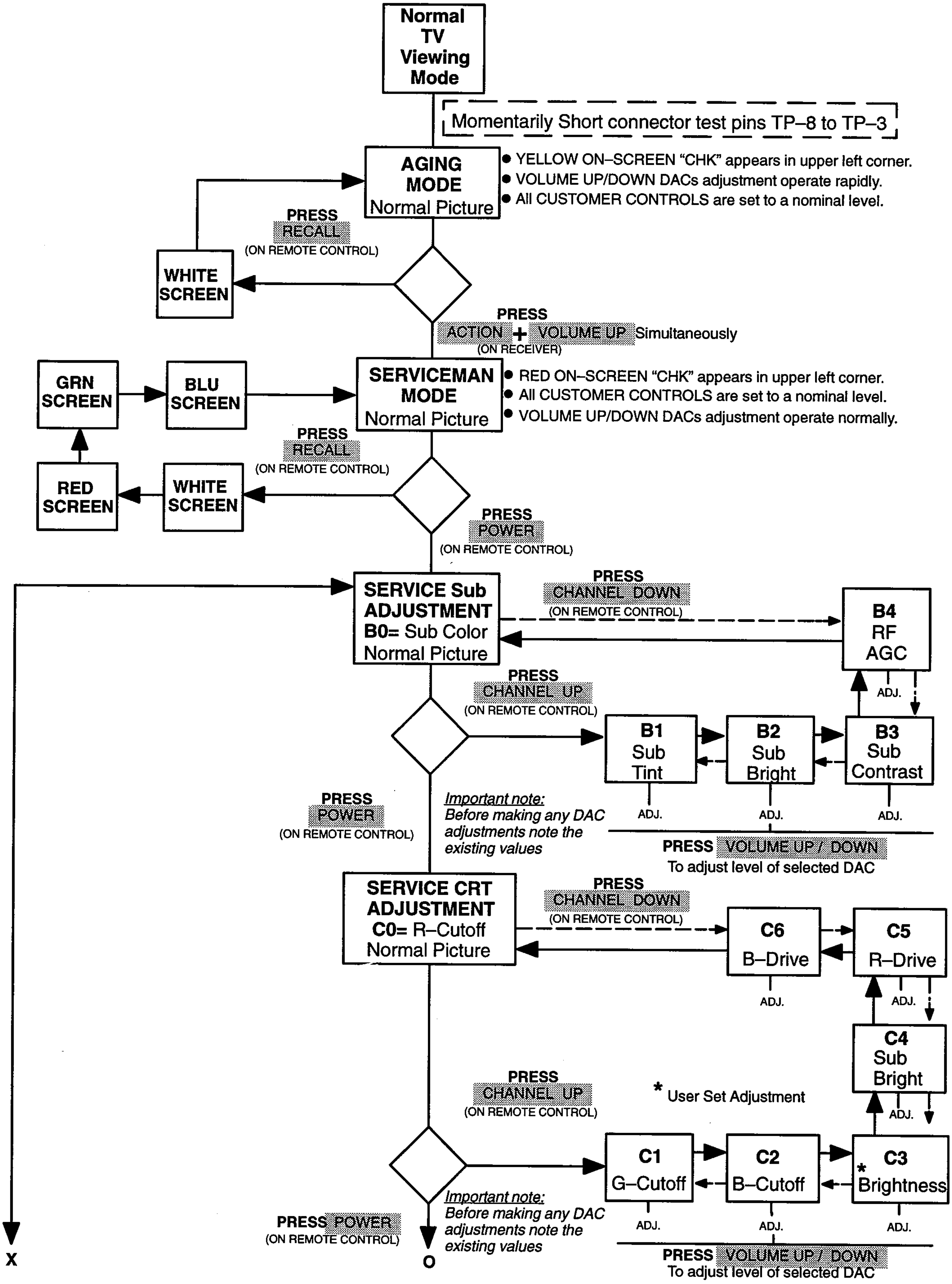
Quick Entry To Serviceman Mode

At times when minor adjustments need to be done to the electronic controls, the method of Entering the Serviceman Mode without removal of the cabinet back is as follows using the Remote Control:

1. Select SET–UP Icon and select CABLE mode.
2. Select TIMER Icon and set SLEEP timer for 30.
3. Press ACTION button twice to cancel Icon Menus.
   Tune to Channel 124.
   Adjust VOLUME to Minimum (0).
   On Receiver press VOL ◄ (decrease). Red CHK appears in upper left corner.

Instructional Flow Chart for Serviceman Mode

Caution: Always EXIT Serviceman Mode after use



- YELLOW ON–SCREEN "CHK" appears in upper left corner.
- VOLUME UP/DOWN DACs adjustment operate rapidly.
- All CUSTOMER CONTROLS are set to a nominal level.

- RED ON–SCREEN "CHK" appears in upper left corner.
- All CUSTOMER CONTROLS are set to a nominal level.
- VOLUME UP/DOWN DACs adjustment operate normally.

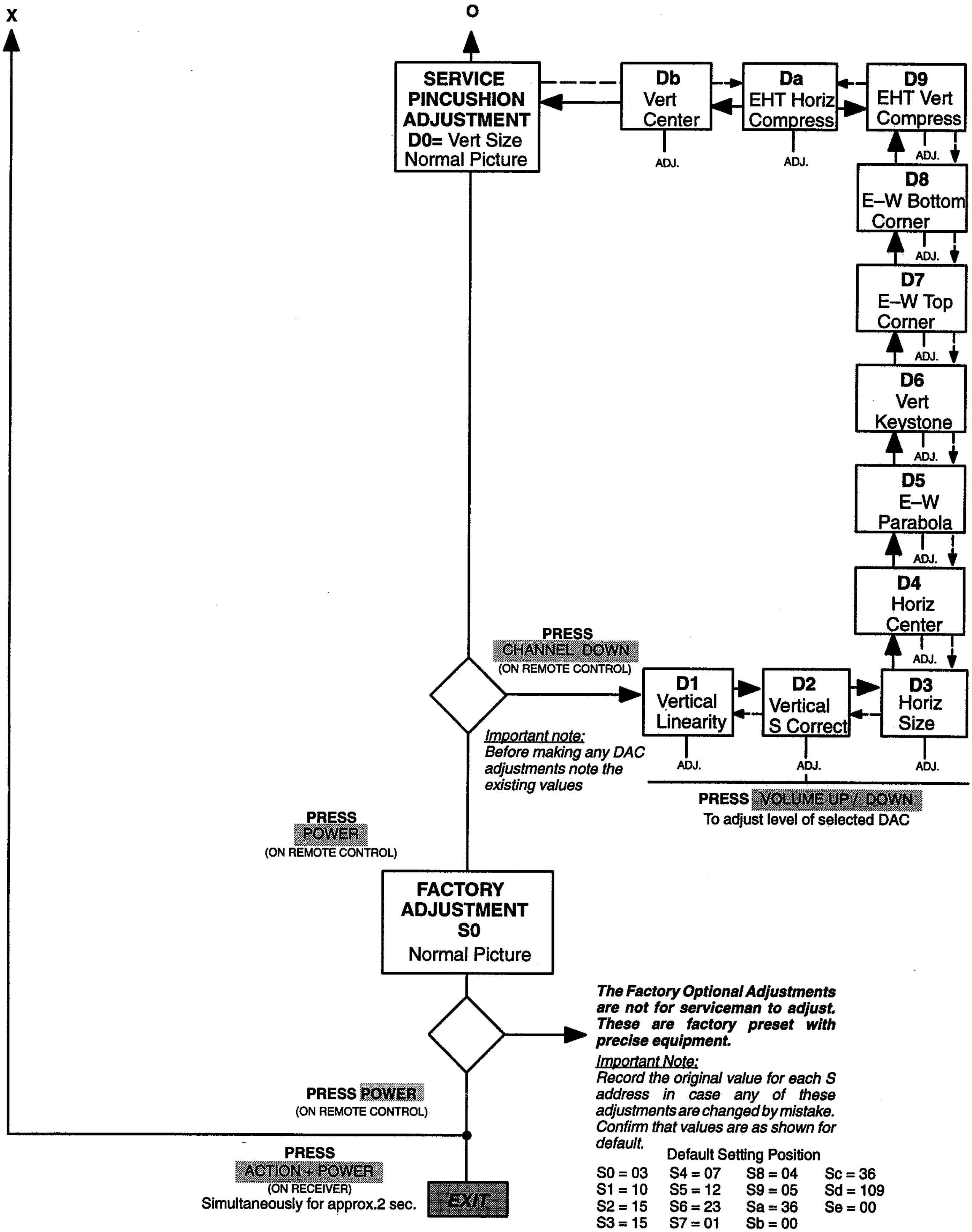
Important note:
Before making any DAC adjustments note the existing values

PRESS VOLUME UP / DOWN
To adjust level of selected DAC

* User Set Adjustment

Important note:
Before making any DAC adjustments note the existing values

PRESS VOLUME UP / DOWN
To adjust level of selected DAC



Important note:
Before making any DAC adjustments note the existing values

The Factory Optional Adjustments are not for serviceman to adjust. These are factory preset with precise equipment.

Important Note:
Record the original value for each S address in case any of these adjustments are changed by mistake. Confirm that values are as shown for default.

Default Setting Position

S0 = 03	S4 = 07	S8 = 04	Sc = 36
S1 = 10	S5 = 12	S9 = 05	Sd = 109
S2 = 15	S6 = 23	Sa = 36	Se = 00
S3 = 15	S7 = 01	Sb = 00	

Receiver shuts off; then turns on, TUNED TO CHANNEL 3 WITH A PRESET LEVEL OF SOUND.

NOTE: This will also erase any Programmed Channels, Channels Caption data and some other user defined items.

Service Sub Adjustments (Electronic Controls)

RF AGC

Serviceman DAC Adjustment B4

This adjustment should be performed only if overloading on strong signal or busy background (snow) is present on moderate strength signals.

Preparation

1. Connect D.V.M. to TP–5.

Procedure

1. In Serviceman Mode for making electronic adjustments, select DAC adjustment (B4) and decrease it until snow appears.
2. Note D.V.M. reading.
3. Increase the adjustment until the snow is eliminated.
4. Confirm that D.V.M. reading has increased.

Sub–Brightness

Serviceman DAC Adjustment (B2)

This adjustment is important for getting proper operation of customer brightness and picture controls. The adjustment must be made after Sub Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after Sub–Brightness is set.

Preparation

1. Connect a color bar signal with 100 IRE white and 7.5 IRE black. (Switch COLOR "OFF" on the generator.) Operate television for a minimum of 10 minutes prior to the adjustment.

Procedure

1. In Serviceman Mode for making electronic adjustments, select DAC adjustment (B2) and adjust so the black bar starts to look grey. Then decrease the adjustment to the point where grey turns to black.

Sub Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or the CRT is replaced.

Preparation

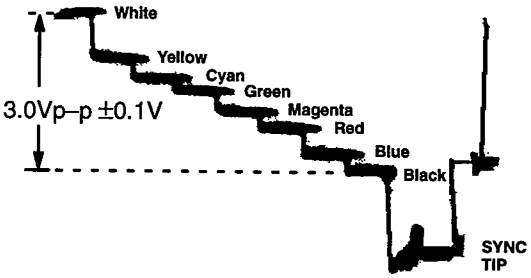
1. Connect a generator pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

NOTE: The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to your pattern used.

2. Adjust the Picture Icon Menu Video controls as follow:
- PICTURE = Max.
- BRIGHTNESS, COLOR = Min.
- SHARPNESS = Center.
3. Switch VIDEO NR (Picture Icon Menu) to "OFF".
4. In the Serviceman Mode prepare the following: Note the original settings for B2, S1 & S2. Then adjust to 0.
5. Connect oscilloscope to TP47G (CRT–Board connector C1–4 or TP35). Set scope horizontal time base to 20µs (horizontal).
6. Connect a jumper from TP–6 to ground (⏚).
7. Connect a jumper from TPD2 to ground (⏚).

Procedure

1. In the Serviceman Mode for electronic adjustments, select DAC Adjustment (B3) and adjust for 3.0Vp–p ±0.1V from white level to black level on video waveform (refer to video waveform detail).



2. Remove jumpers (Preparation steps 5 & 6).
3. Reset B2, S1 & S2 to original setting.

Sub Tint/Color Adjustment

Serviceman DAC Adjustment (B1) (B0)

Preparation

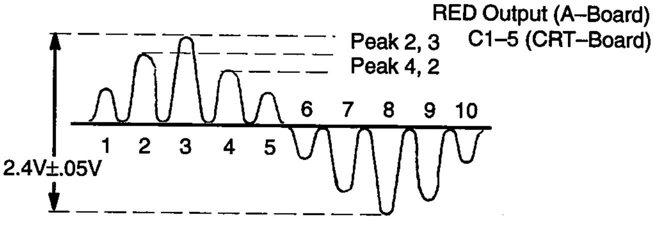
1. Normalize the Video adjustments (Picture Icon Menu).
2. Switch AI PICTURE (AI Icon Menu) to "OFF".
3. Connect a jumper between connector test pin TP–6 and ground (⏚).
4. Connect a jumper between TPD2 and ground (⏚).
5. In the Serviceman Mode for making electronic adjustments. Prepare the following DACs:

Note original settings then set as follows:

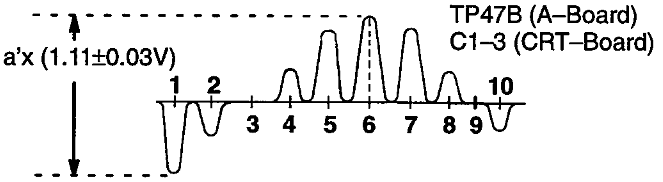
• Sub Bright (B2)	00
• Red Cutoff (C0)	2 020
• Grn Cutoff (C1)	127
• Blu Cutoff (C2)	2 020
• Black Expand Gain (S1)	00
• White Gamma Gain (S2)	00

Procedure

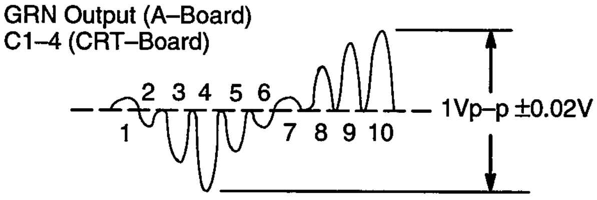
1. Connect a Rainbow Color Bar signal.
2. In the Serviceman Mode for making electronic adjustments, note DAC levels for RED DRIVE (C5) and BLU DRIVE (C6). Set each to 127.
3. Connect oscilloscope to RED Output (A–Board), connector C1 pin 5 or TP36 (CRT–Board).
4. In the Serviceman Mode for making electronic adjustments, select DAC Sub Bright (B2) and adjust so that no saturation appears in waveform.
5. Select DAC SUB COLOR (B0) and adjust so that peak to peak amplitude is 2.4V±0.05V as shown in figure.



6. Select DAC Sub Tint (B1) and adjust RED Output waveform so peaks 2, 3 = peaks 4, 2 as shown in figure on previous page.
7. Measure new p–p waveform and make note.
8. Connect oscilloscope to BLU Output (A–Board) or TP36 (CRT–Board).
9. Select DAC Demodulation Gain (S6) and adjust so peak to peak is equal to step No. 7 p–p (a') times 1.11±0.03V as in figure.



10. Connect oscilloscope to RED Output (A–Board), connector C1 pin 5 or TP36 (CRT–Board). Repeat step No. 6.
11. Connect oscilloscope to GRN Output (A–Board) or connector C1 pin 4 (CRT–Board).
12. Select DAC adjustment (B0) and adjust for peak to peak waveform to be 1V p–p ±0.02V.



13. Remove jumpers (Preparation step 4 & 5).
14. Reset DACs (S1) to 10 and (S2) to 15.
15. Connect a Studio Color Bar signal and confirm that color phase and saturation are normal.

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C0) (C1) (C2) (C3) (C5) (C6)

Minor Touch–Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for "good grey scale and warm highlights".

- LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select cutoff (C0) RED, (C1) GRN, (C2) BLU and adjust picture for grey.
- HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C5) RED, (C6) BLU and adjust for warm whites.

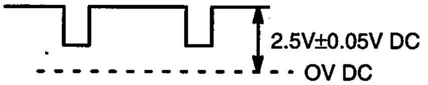
Complete Adjustment

Preparation

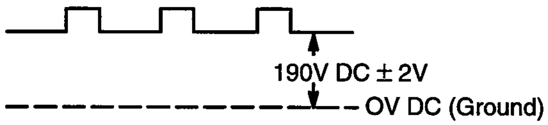
1. Turn Receiver "ON" and allow 10 minutes warm up at high brightness.
2. Apply color bar signal with color "OFF".
3. Set Picture Icon Menu Video controls to Normalize.
4. Enter Serviceman Mode and preset DAC adjust low lights (C0, C2) to Minimum (C1) to 128 and preset DAC adjustments high lights (C5, C6) to 84. Preset Sub Bright DAC (C4) to 64.
5. Turn SCREEN control (part of FBT T551) fully counterclockwise.

Procedure

1. Connect oscilloscope to TP35 (CRT–Board).
2. In Serviceman Mode for making electronic adjustment, select Sub Bright (C4).
3. Press RECALL button on the Remote Control to collapse the raster. (Service SW)
4. Observe oscilloscope waveform at Horizontal rate and adjust Serviceman Mode Sub Bright DAC (C4) for scanning period of 2.5V±0.05V above DC ground shown in detail.



5. Press RECALL button on the Remote Control to restore the raster.
6. Connect scope to GRN Cathode (KG) on CRT–Board.
7. In Serviceman Mode for making electronic adjustments, select GREEN CUTOFF DAC (C1).
8. Press RECALL button on the Remote Control to collapse the raster. (Service SW)
9. View scope trace at Horizontal rate and adjust Serviceman Mode DAC (C1) for the scanning period to be 190V± 2V above DC ground. (See detail)



Adjustment Waveform Detail

10. Turn Screen Control (part of FBT) slowly clockwise until a green horizontal line appears just slightly.
11. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C0) RED, (C2) BLU; increase their colors to create a white horizontal line.
12. Press RECALL button on the Remote Control to restore full raster.
13. Confirm good gray scale by viewing B/W color bar pattern.
14 In Serviceman Mode for making electronic adjustments select DAC DRIVE adjustments (C5) RED, (C6) BLU and adjust for warm white in white color bar of pattern.
15 Adjust Serviceman Mode BRIGHT (C3) from low scale to high scale and check Black and White tracking.
16. If correction needed: perform **Minor Touch – Up Method.**
17. Perform Sub Brightness adjustment procedure.

Service Pincushion Adjustments (Electronic Controls)

Vertical DC Voltage and Dynamic Range Confirmation

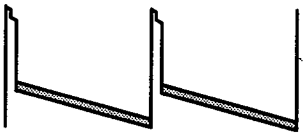
Serviceman DAC Adjustment (Db)

Preparation

1. Connect DVM to deflection yoke DY–2 to ground.
2. Connect Oscilloscope to deflection yoke DY–3 to ground.
3. On Main Chassis Board apply a jumper from T771 pin 5 to L770 pin 2.
4. Apply a monoscope pattern.

Procedure

1. Enter Serviceman Mode for making electronic adjustments. Select DAC adjustment (Db).
2. Adjust DAC DB for DVM reading of 15.5V± 1.0V.
3. Confirm that the upper and lower side of the oscilloscope vertical waveform has no distortion as shown.



4. Remove jumpers (Preparation step 3).

Vertical Linearity

Serviceman DAC Adjustment (D1)

Preparation

1. Apply crosshatch pattern.

Procedure

1. Enter Serviceman Mode for electronic adjustments. Select DAC adjustment (D1) and adjust crosshatch pattern so boxes above horizontal center are the same proportion as boxes below horizontal center.

Vertical Size & S Correction

Serviceman DAC Adjustments (D0, D2)

Preparation

1. Apply a crosshatch pattern.

Procedure

1. Enter Serviceman Mode for making electronic adjustments.
2. Select DAC adjustment (D0) and decrease the size of the pattern.
3. Increase the (D0) adjustment until the pattern touches the top and bottom edge of the Screen. Continue increasing pattern until approximately 1/2 inch larger.
4. Select DAC adjustment (D2) and adjust so top and bottom squares are the same proportion as center squares.
   a) Increase adjustment to make top and bottom squares smaller.
   b) Decrease adjustment to make top and bottom squares larger.

E–W Pincushion Correction

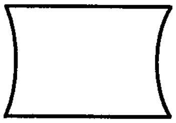
Serviceman DAC Adjustments (D5, D7, D8)

Preparation

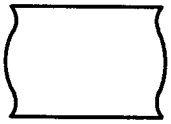
1. Apply a crosshatch pattern.
2. Normalize the PICTURE Icon Video adjustments.
3. Set the PICTURE Icon AUTO COLOR Sw. to "OFF". (when applicable)
4. Adjust T/B (R786) on A–Board to center.

Procedure

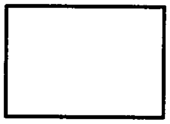
1. Enter Serviceman Mode for making electronic adjustments. Select DAC (D5) and adjust for 1st and 3rd vertical lines on E & W sides are straight as shown.



min adjustment

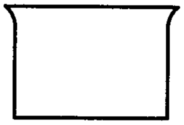


max adjustment

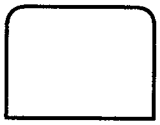


correct adjustment

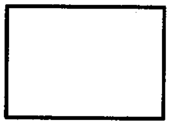
2. Select DAC (D7) and adjust vertical lines so top is straight as shown.



min adjustment

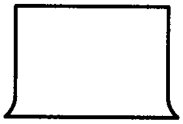


max adjustment

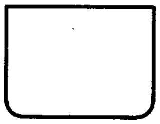


correct adjustment

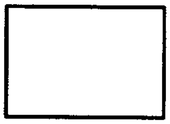
3. Select DAC (D8) and adjust vertical lines so bottom is straight as shown.



min adjustment



max adjustment



correct adjustment

4. Adjust L770 (see Mechanical Adjustment).

Horizontal Centering

Serviceman DAC Adjustment (D4)

Preparation

1. Connect crosshatch generator.

Procedure

1. In Serviceman Mode for making electronic adjustments. Select DAC adjustment (D4) and adjust so center of crosshatch pattern is centered (horizontally) on CRT screen.
2. EXIT Serviceman Adjustment Mode.

Horiz Size

Serviceman DAC Adjustment (D3)

Preparation

1. Apply a crosshatch pattern.

Procedure

1. Select Serviceman Mode for making electronic adjustments. Select D3 and decrease the adjustment until the pattern shrinks horizontal between sides screen.
2. Increase D3 until pattern fills horizontally to screen sides and advance the adjustment register 3 more digits.

Keystone

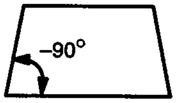
Serviceman DAC Adjustment (D6)

Preparation

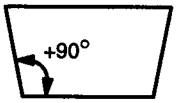
1. Apply a crosshatch pattern.

Procedure

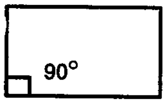
1. Enter Serviceman Mode for making adjustments. Select DAC (D6) and adjust so that vertical lines are 90° from horizontal lines as shown.



min adjustment



max adjustment



correct adjustment

MPU Reference Oscillator (Se)

Preparation:

1. Connect frequency counter from TPS1 (IC001 Pin 25) to cold ground (⏚).

NOTE: Frequency Counter probe capacitance should be 8PF or less.

Procedure:

1. Turn Receiver “OFF” with AC power applied.
2. Measure TPS1 (IC001 pin 25) for the time base period of the waveform (record reading).
3. Turn Receiver back “ON”.
4. Place Receiver into serviceman Mode for making electronic adjustment, select DAC Adjustment (Se).
5. Set (Se) based on following formula:

$$Se = 1350128 - \frac{7372800000}{\text{pin 25}}$$

NOTE: After the proper number is loaded into Se, pin 25 measurement will remain the same as previously measured.

Sample chart for loading Se (register range is 0 thru 255).

Se register	pin 25 reading
0	5460.816
1	5460.820
2	5460.824
│	│
127	5461.329
128	5461.333
129	5461.337
│	│
253	5461.839
254	5461.843
255	5461.847

NOTE: If TPS1 (IC001 pin 25) is measured in Hz unit with the Frequency Counter use following formula:

$Se = 1350128 - [7372.8 \times \text{pin 25 (Hz)}]$

Must have at least four digits of resolution behind decimal point for pin 25 reading.

Sample: 000.0000

Service Adjustments (Mechanical Controls)

Video Level R115 (N–Board)

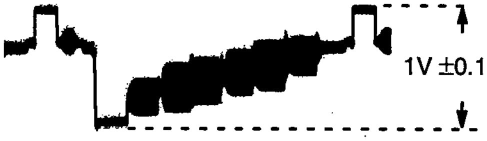
CAUTION: Do not adjust unless control has been replaced or control was accidentally misadjusted.

Preparation

Obtain an NTSC color bar pattern with 100 IRE white and 87.5% modulation.

Procedure

1. Connect oscilloscope to TP12 (connector A21 pin 6). Use cold ground for scope connection. Set scope at horizontal time base.
2. Adjust R115 for 1V(±0.1V)p–p from sync tip to white level. (See detail.)
3. Set SUB CONTRAST adjustment.



AFC Field Adjustment L152 (N–Board)

1. Select TV antenna mode with Set Up Menu Icon.
2. Defeat AFC by applying jumper from TPS7 to ground (⏚).
3. Connect a digital voltmeter to AFC test point TP16 (N2–1).
4. Use Remote Control to Check all active High Band channels 7~13 for AFC voltage range. Select channel with AFC voltage in approximate center of voltage range.
5. Adjust L152 for 2.5V ±0.5V at TP16.
6. Check all active channels for proper AFC correction. Touch up L152 if required. Remove jumper in step 2.

NOTE: Do not use TV/CABLE channel with offset carriers for adjustment or in determination of low and high range of AFC voltage.

Sound Alignment L201 (N–Board)

1. Select active TV channel.
2. Attenuate signal (loosely couple antenna lead or use RF attenuator pad) for noisy sound.
   - Adjust L201 for maximum sound. Signal to noise ratio is best when L201 is peaked.
3. Connect antenna or remove RF attenuator for strong signal.

Comb Filter Adjustment – R3215 and L3202 (X–Board)

1. Connect an NTSC color bar generator (not rainbow generator) to video Input.
2. Normalize Picture Menu Video Adjustments. Then adjust SHARPNESS to Max. and COLOR to Min.
3. Connect an oscilloscope X1 pin 1.
4. Set oscilloscope sweep rate to view color burst signal on horizontal sync pulse.
5. Set BALANCE control R3215 fully clockwise. Burst amplitude should increase making it more visible.
6. Adjust phase coil L3202 for Minimum burst amplitude.
7. Re–adjust BALANCE control R3215 for Minimum burst amplitude.
8. Repeat procedure steps 6 & 7.

Focus (Part of T551)

Preparation

1. Connect Signal generator and select dot pattern.

Procedure

1. Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.
   (a) adjust for best center
   (b) adjust for best area between center and top right corner.

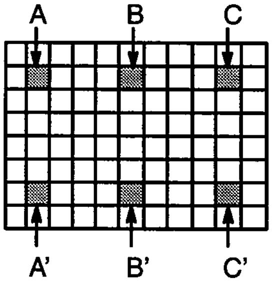
Top/Bot Pincushion Correct (R786, L770) A–Board

Preparation

1. Apply a crosshatch pattern.
2. Normalize the PICTURE Icon Video adjustment.
3. Set the PICTURE Icon AUTO COLOR to "OFF".

Procedure

1. Adjust T/B control R786 to center position.
2. Adjust L770 so height of box A, A', B, B', C, C' are approximately the same size.
3. Adjust R786 to make box A = A' = B = B' = C = C'.



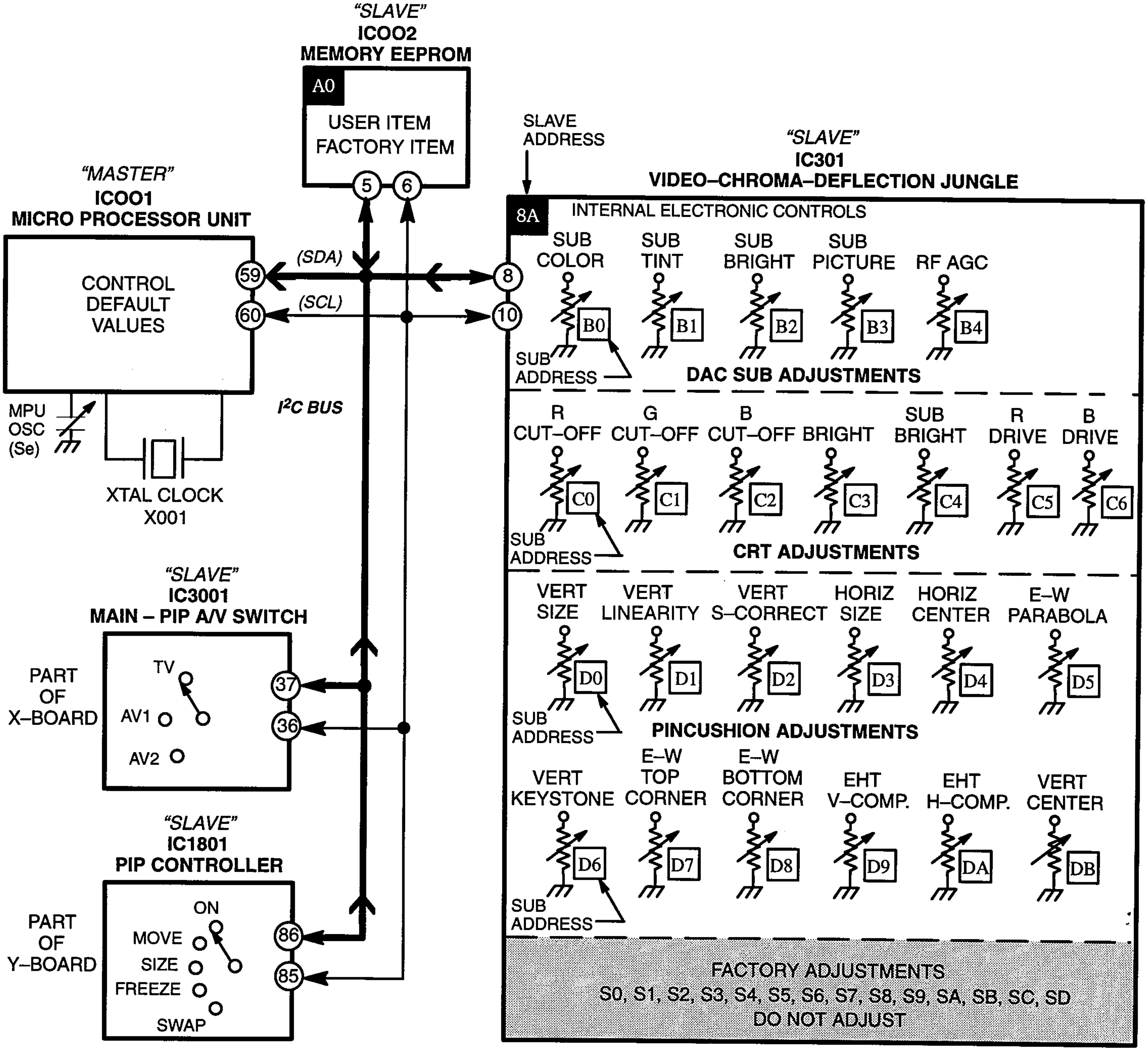
New Circuits

I^{2}C Bus Line System

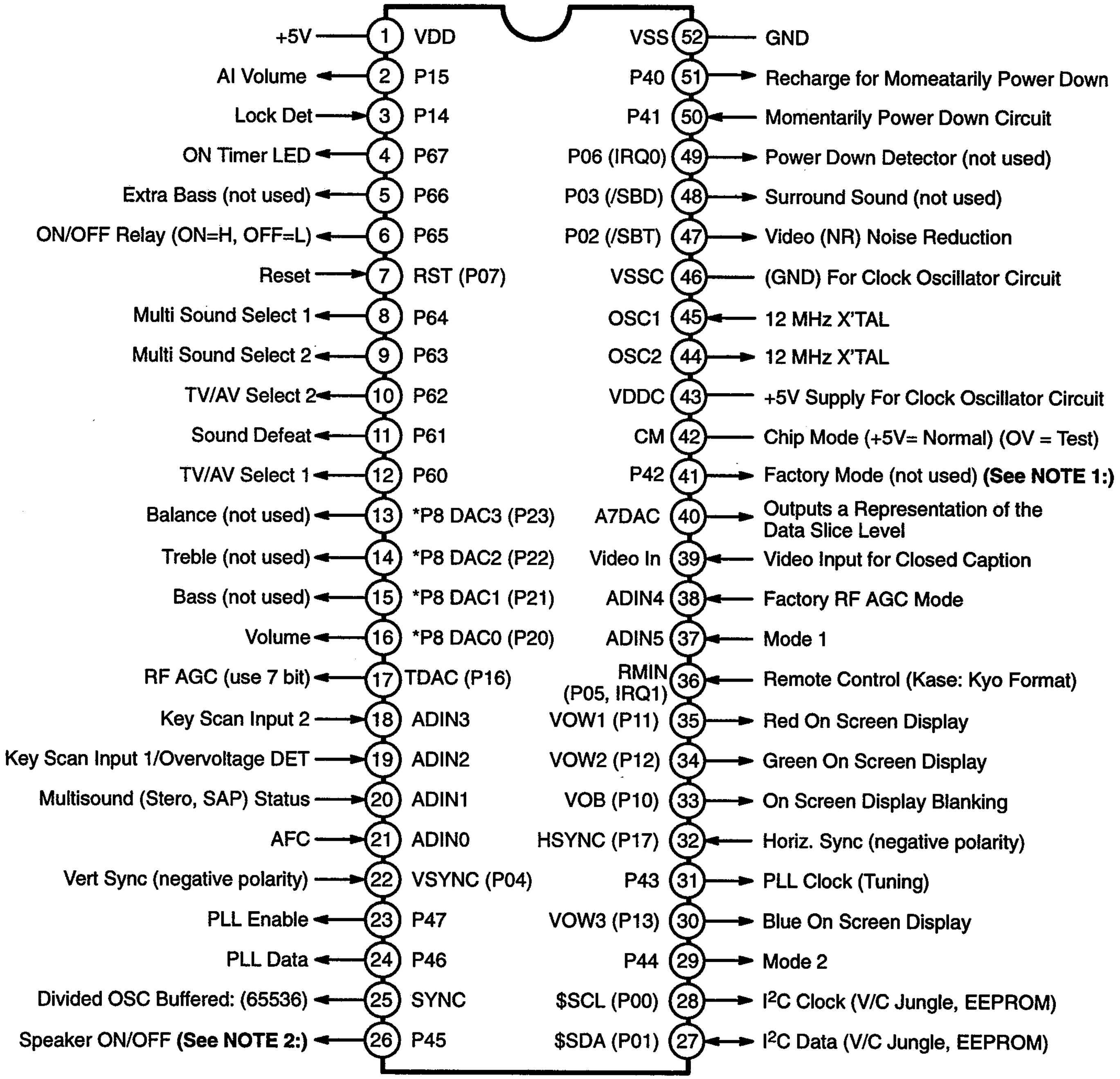
This Receiver makes use of one of the latest electronic technologies by using an I^{2}C (Inter–Integrated Circuit) Bus Line Concept. Two wires, SDA (Serial Data) and SCL (Serial Clock) carry information between devices connected to the Bus. Each device connected to the Bus has a unique address for receiving data information (a Receiver) from a source (the Transmitter).

The devices are also considered to be a "Master" or a "Slave" when data is transmitted or received. In this Receiver, the "Master" (Micro Processor Unit,IC001) is the device which initiates a data transfer in the Bus line and generates the clock signal required to permit the data to be sent. The "Slaves" (MEMORY I^{2}C EEPROM, IC002; VIDEO–CHROMA–DEFLECTION JUNGLE, IC301; AUDIO/VIDEO SWITCH, IC3001 and PIP CONTROLLER, IC1801) are the devices addressed by the MPU and receive the data transmitted.

This system usually performs a control function or a switch function. Many mechanical controls and switches that are required to operate the television receiver are replaced with the I^{2}C bus line system. Instead of adjusting and switching various mechanical controls and switches, many of their functions can be performed electronically. The number of connections is thereby reduced which results in a simplified circuit design and increased reliability (less soldered joints, connections and contacts). The Serviceman has easy access and operation of the adjustments and switches by using the Receiver's Remote Control and the "On Screen" menus, used with the I^{2}C Bus Line System.



IC001 MPU IN/OUT Pins and Functions



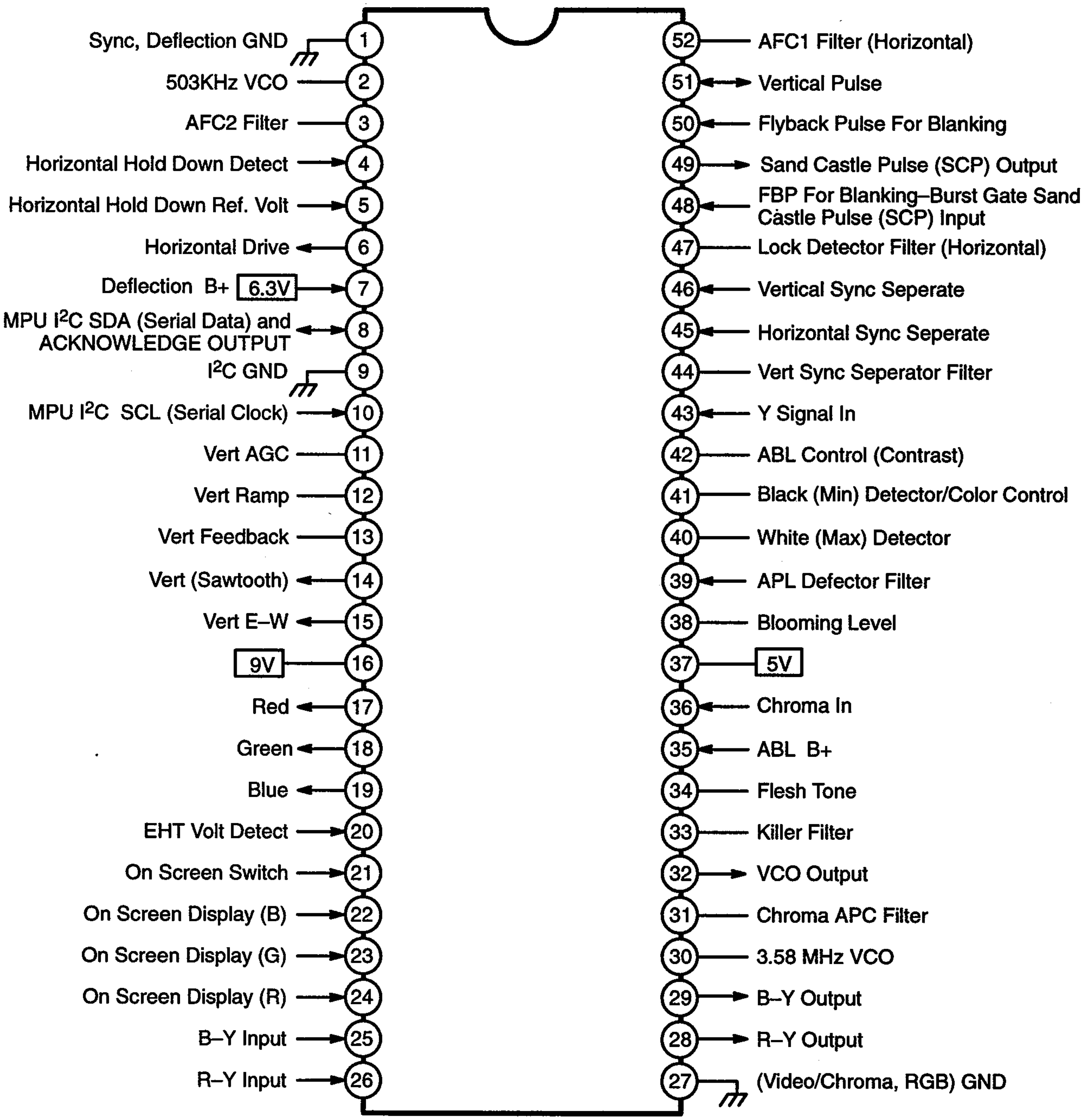
NOTE 1:

Momentarily pulling pin 41 to ground and releasing it will put the microprocessor into factory aging mode. Holding this line at ground will inhibit microprocessor access to I^{2}C bus line.

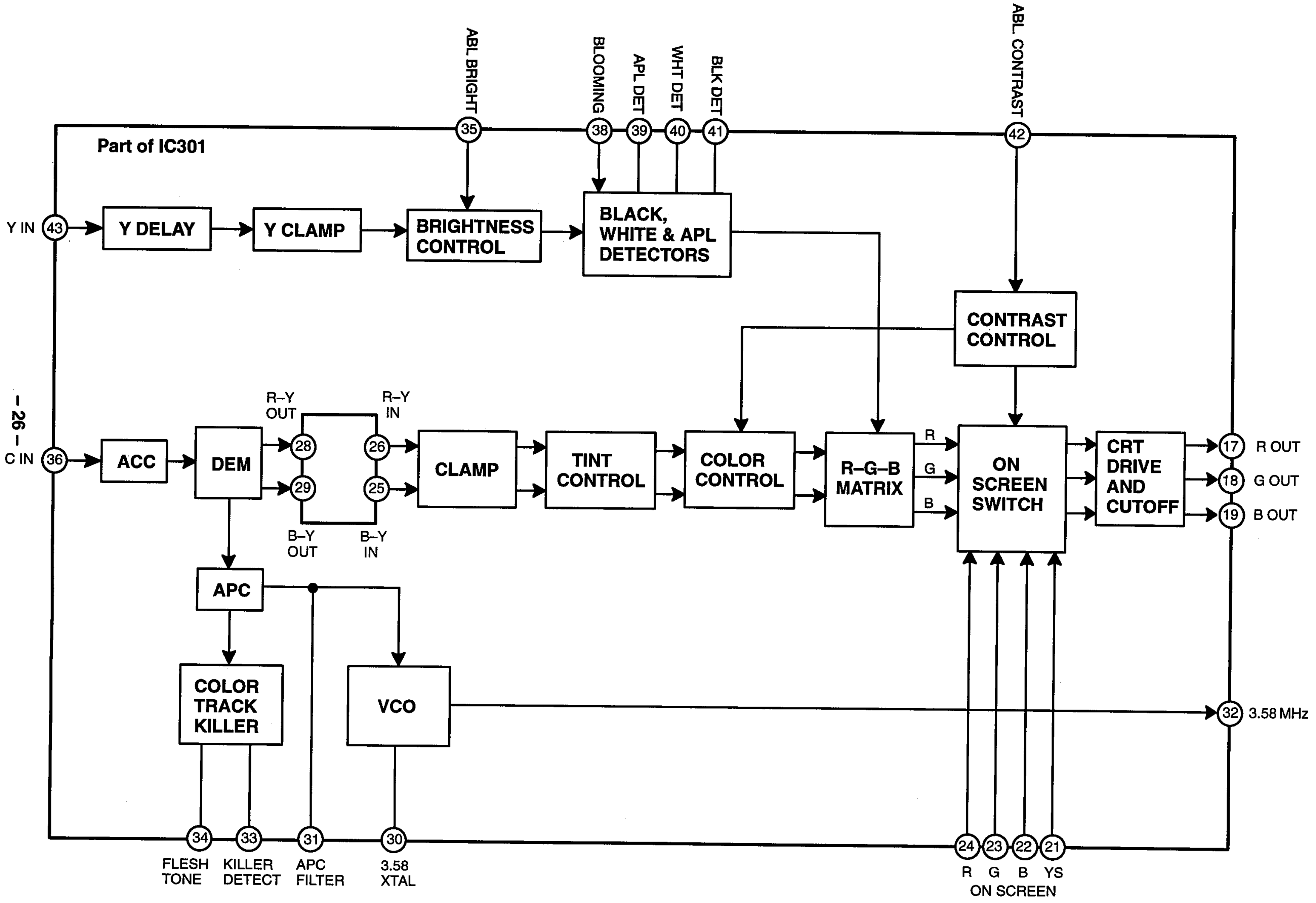
NOTE 2:

Speaker On/Off is also used as audio defeat line.

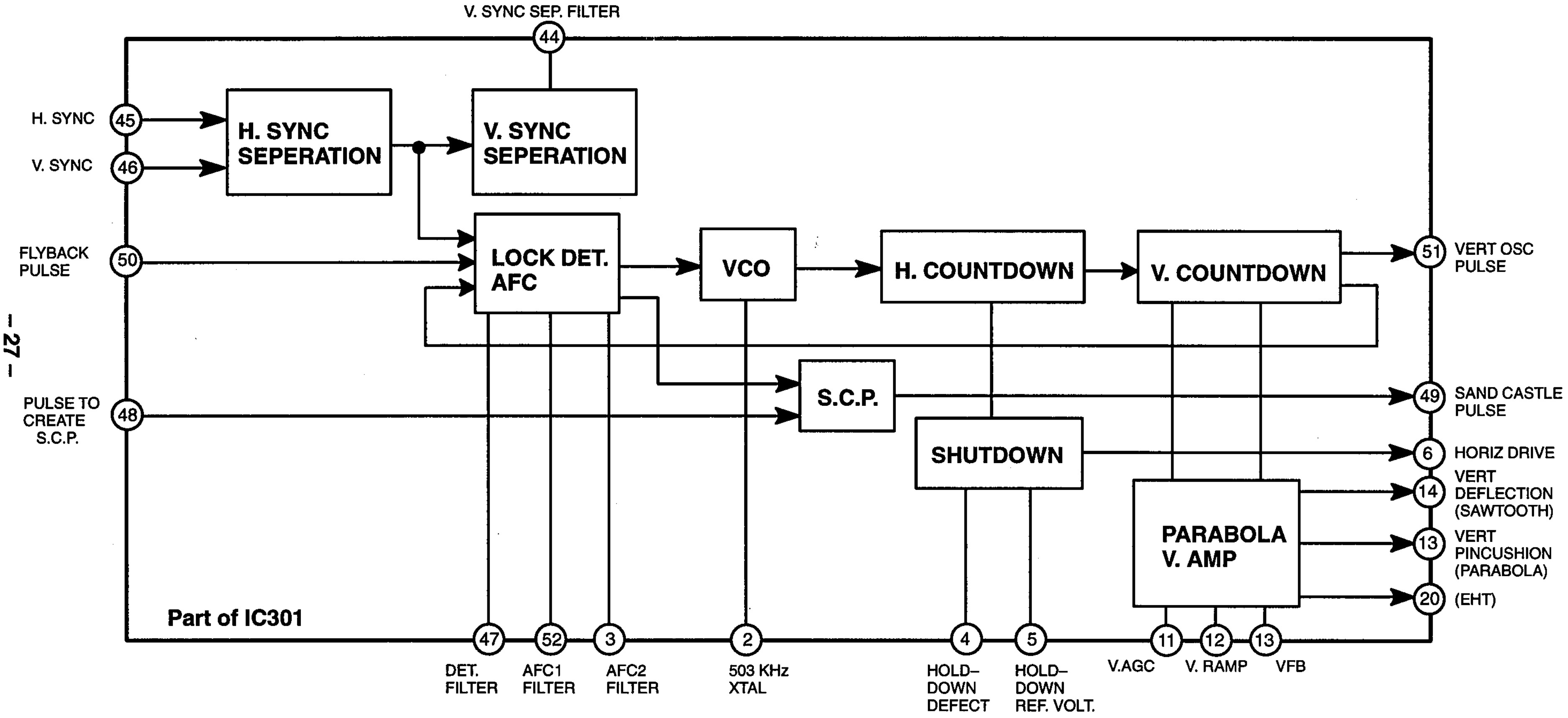
IC301 Video – Chroma – Deflection Jungle



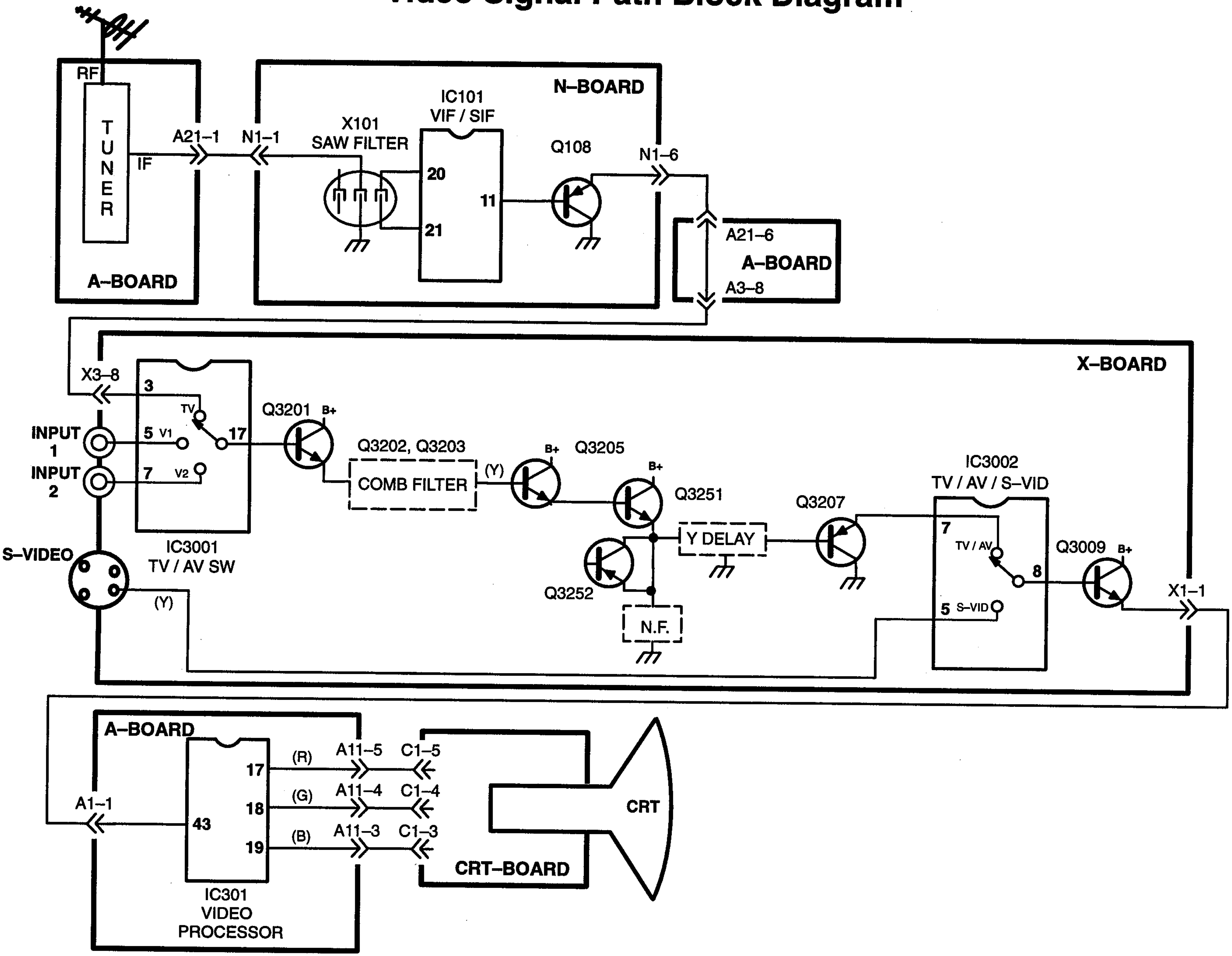
IC301 Video – Chroma Block Diagram



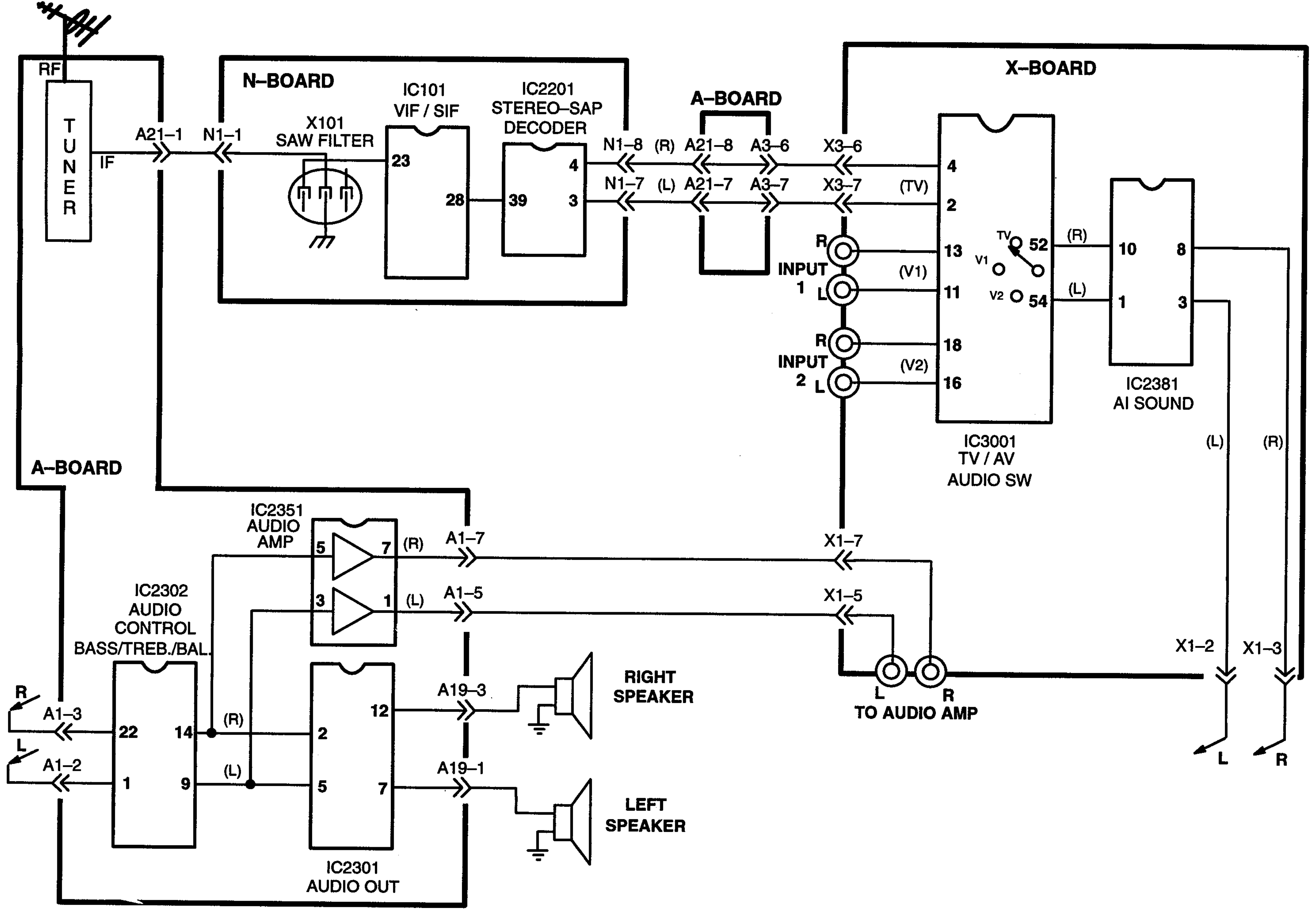
IC301 Deflection Block Diagram



Video Signal Path Block Diagram



Audio Signal Path Block Diagram



Horizontal Hold Down Circuit

This circuit protects against excessive high voltage and CRT beam current. If for any reason high voltage and/or CRT beam current exceeds a predetermined level, the Hold Down Circuit operates to increase horizontal frequency. If the level increases more, the Hold Down Circuit will blank the CRT.

CRT heater voltage from pin 5 of flyback transformer (FBT) T551 is rectified by diode D531. This voltage is directly proportional to high voltage variations. The voltage is filtered and divided down by precision resistors R532/R533 to approximately 2.4V and applied to Pin 4 (Hold Down) of IC301. With this voltage as a normal condition, the Hold Down Circuit is inactive and has no effect on horizontal frequency or blanking the CRT.

The Hold Down Circuit inside IC301 is a (NPN) differential amp. One base of the differential amp is connected to Pin 4 (approximately 2.4V). The other is connected to Pin 5 through an internal voltage divided of equal resistance. Pin 5 is clamped at a 6V DC reference voltage by zener diode D532. The voltage at the base of the differential amp is 3V. (1/2 of the reference voltage, 6V)

Basically, the Hold Down Circuit compares the voltage at Pin 4 (approximately 2.4V) to half of Pin 5 (clamped 6V). If CRT heater pulse amplitude from T551 (representative of high voltage) increases, the positive voltage at the cathode of D531 and at Pin 4 of IC301 also increase.

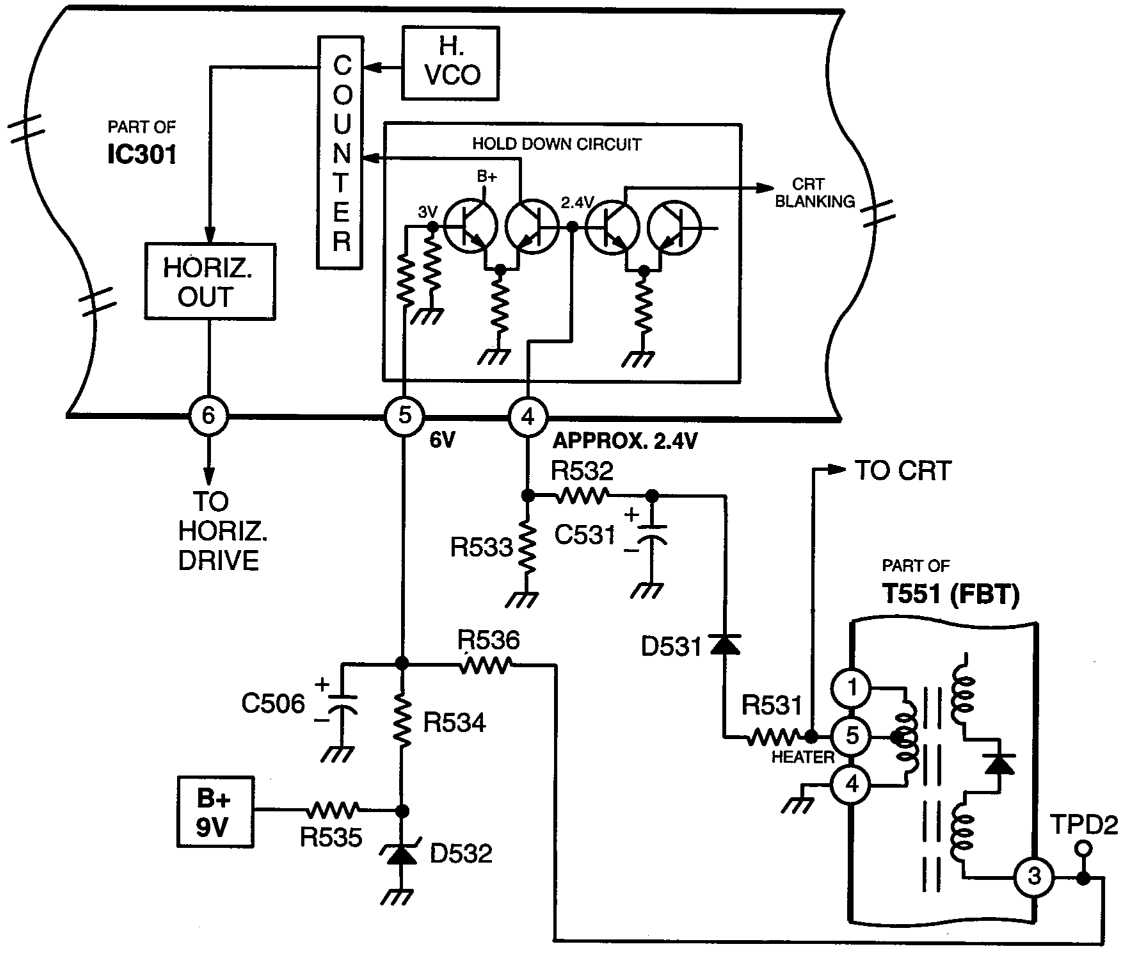
When the increased DC voltage at Pin 4 exceeds half of the Pin 5 reference voltage by a predetermined amount, the Hold Down Circuit (differential amp) changes conduction state and shifts the horizontal count down for a higher sweep frequency (out of sync condition) to prevent unsafe operation. For further safety when the Pin 4 voltage is extremely excessive, another internal differential amp changes state to blank the CRT.

An increase in CRT beam current produces more negative ABL voltage at Pin 3 of T551 (FBT) which is coupled to Pin 5 of IC301 via resistor R536. This increased negative voltage opposes the positive voltage at Pin 5 and lowers the DC reference voltage to less than 6V. This in turn causes the Hold Down Circuit to operate sooner when Pin 4 voltage increases.

Thus excessive levels of high voltage and/or increased CRT beam current cause detuning of the horizontal oscillator frequency and eventual blanking of the CRT to assure operation within safe limits.

The B+ circuit and the Hold Down Circuit are not adjustable. If components in the designated areas of the schematic for critical parts are changed, operation of the Hold Down Circuit must be checked to insure that high voltage and CRT beam current does not exceed safe operation parameters. Check the following for possible failure:

1. Measure the DC voltage at Pin 4 of IC301 (reading should be close to +2.4V). If not, check D531, R531, C531, R532, R533 and IC301.
2. Measure the DC voltage at Pin 5 of IC301. (reading should be +6V) if not, check R536, C506, R534, D532, R535 and IC301.



Power Supply Shutdown

MPU (IC001) Pin 19 is a dual function Pin. The ACTION button function is activated when Pin 19 voltage is 0.588V or less. An Over Voltage Protect function is activated when Pin 19 voltage is 3.2V or higher.

With the Receiver "ON", current is monitored from the B+ 141V that supplies the horizontal and from the B+ 27V that supplies the vertical and pincushion circuits. The monitored current is fed back to IC001 pin 19 as a voltage. As long as the voltage at IC001 pin 6 is 0.6V~3.1V, the Receiver operates normally.

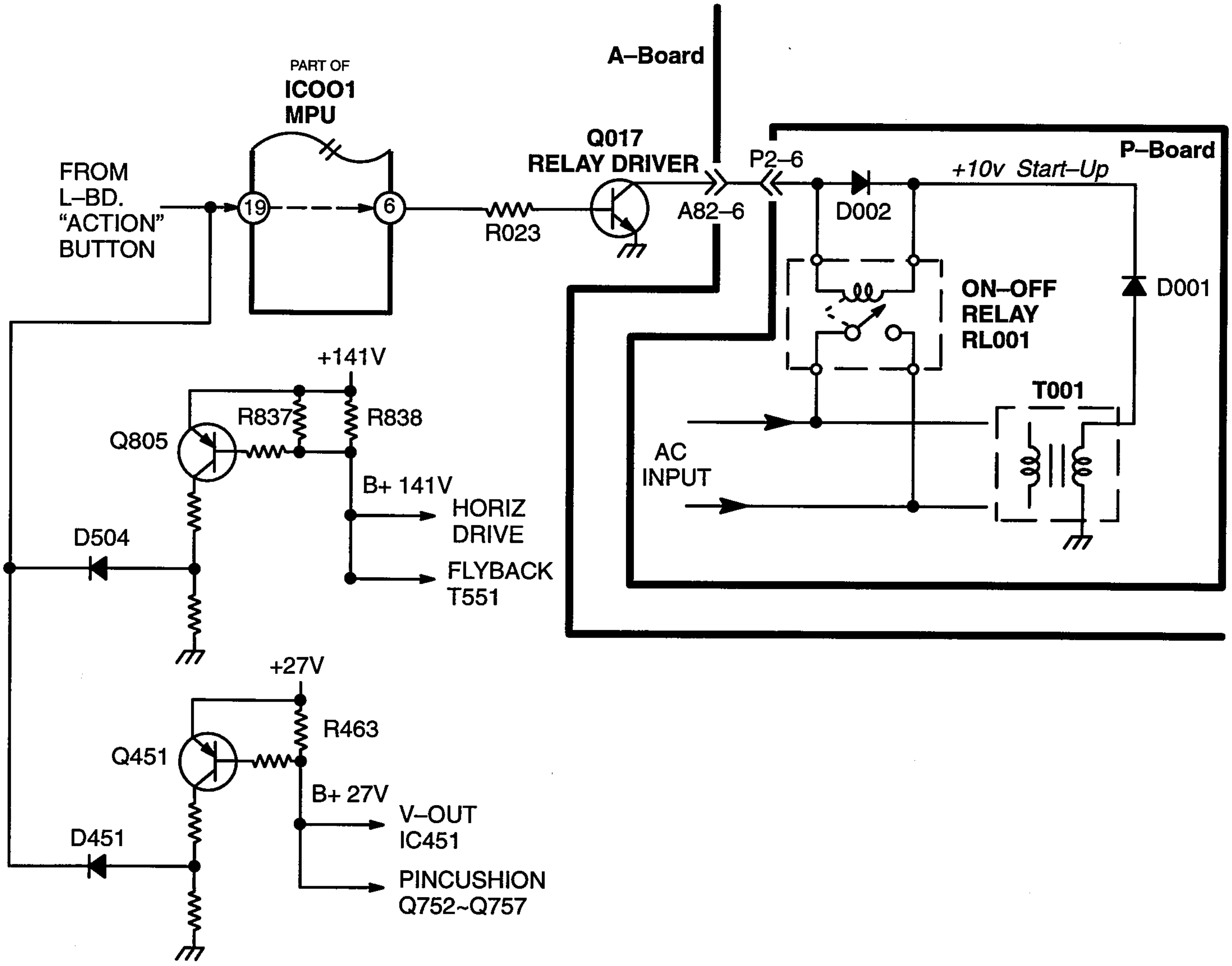
The horizontal current is monitored by Q805 and its associated circuitry. If for some reason there is a short in the horizontal output or flyback, its current draw through parallel 1 ohm resistors R837/R838 increases. The voltage across them increases. As a result, the voltage at the base of Q805 decreases. With the emitter fixed at B+ 141V Q805 (PNP transistor) conducts and draws current. It's collector voltage rises and D503 conducts. D503 supplies a voltage that is fed back to IC001 pin 19.

The vertical and pincushion current is monitored by Q451 and its associated circuitry. If for some reason there appears a short in the vertical or pincushion, the current draw through 1.5 ohm resistor R463 increases and its voltage drop in increases. As a result, the voltage at the base of Q451 decreases. With its emitter fixed at B+ 27V, Q451 (PNP transistor) conducts. Its collector voltage rises and causes D451 to conduct. D451 supplies a voltage that is fed back to IC001 pin 19.

When the horizontal or vertical circuits exceed their normal current draw, the B+ feedback voltage increases to 3.2V and above at IC001 pin 19. Internal circuitry of IC001 will cause pin 6 (power) to go low. When this happens, the base of Q017 is held low and it can't conduct. The "On/Off Relay" on the P–Board now has no return to ground. Relay RL001 deenergize to open the "ON" contact in the relay and the Receiver Power Supply is off. This condition will remain until AC power is momentarily disconnected.

If when pressing the POWER button after AC is applied again and the Receiver comes on but goes off after a few seconds, there is a problem in one of the over current monitor circuits.

WARNING Because pin 19 is a dual function pin, do not press ACTION button on the Receiver. Pressing the button when the above symptom appears will inhibit the protection function.



Service Notes

Leadless Chip Components

Chip transistors must be replaced with identical chip components due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chip capacitor or resistor board solder pads may have holes thru the board but hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor replacement may also be limited for the same reason. It is recommended that identical chip components be used for replacement purposes.

Chip resistors have a three digit numerical resistance code – 1st and 2nd significant digits and a multiplier. Example: 162=1600 or 1.6K ohm resistor, 0=0 ohms (jumper).

Chip capacitors generally do not have the value indicated. The body color indicates a general range of capacity.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor. See coding chart.

Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

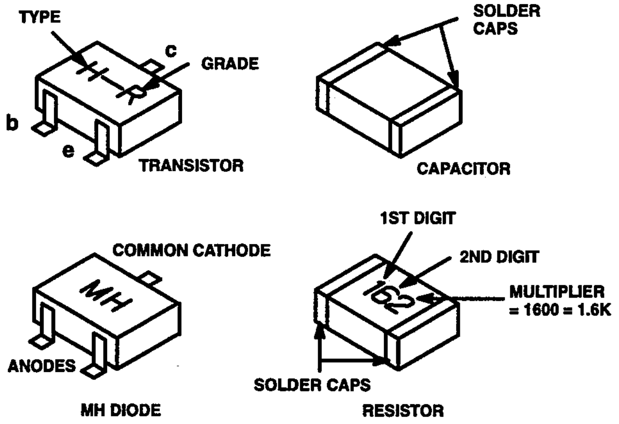
Component Removal

1. Use solder wick to remove solder from component end caps or terminals.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put small amount of solder on board soldering pads.
2. Hold chip component against soldering pads with tweezers or a miniature alligator clip and apply heat to pad area with 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.
3. Remove iron and continue to hold component against pads until solder solidifies.

Chip Components

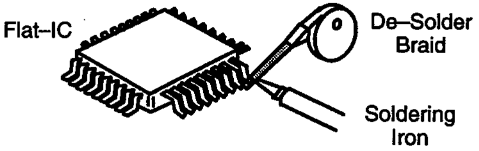


How to Replace Flat–IC

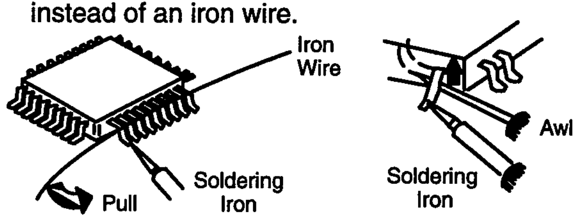
– Tools Required –

- Soldering iron
- De–solder braids
- Iron wire or small awl
- Magnifier

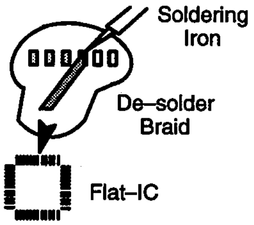
1. Remove the solder from all pins of Flat–IC by using de–solder braid.



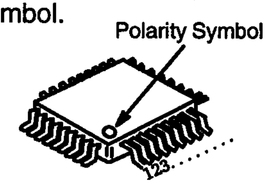
2. Put an iron wire under the pins of Flat–IC and pull it in the directions indicated while heating the pins using a soldering iron. A small awl can be used instead of an iron wire.



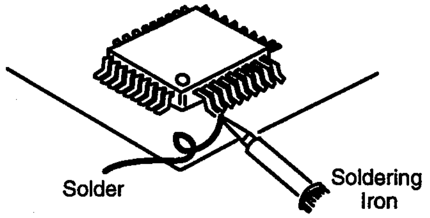
3. Remove the solder from all pads of Flat–IC by using de–solder braid.



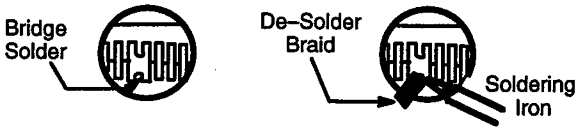
4. Put the new Flat–IC in place (apply the pins of Flat–IC to the soldering pads where the pins must be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or dry joint between pins and soldering pads. To remove solder bridge, use de–solder braid as shown in figure.



NOTE: ***These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of IC's when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the compound loose.***

REPLACEMENT PARTS LIST

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CRA801	**EXNG131P365**	**RES–CAP 130PF/3.6 MEG**
CRA802	**EXNG131P365**	**RES–CAP 130PF/3.6 MEG**
		CAPACITORS
C0**	ECKF1H103KB	CAP,C .01UF–K–50V
		CT–2742SFTM
C001	ECEA1CU102	CAP,E 1000UF/16V
C003	ECEA1CU100	CAP,E 10UF/16V
C004	ECKF1H101KB	CAP,C 100PF–K–50V
C006	ECKF1H103ZF	CAP,C .01UF–Z–50V
C007	ECEA0JU101	CAP,E 100UF/6.3V
C008	ECEA1CU471	CAP,E 470UF/16V
C009	ECKF1H103ZF	CAP,C .01UF–Z–50V
C012	ECEA0JU101	CAP,E 100UF/6.3V
C014	ECCF1H560JC	CAP,C 56PF–J–50V
C015	ECKF1H101KB	CAP,C 100PF–K–50V
C016	ECKF1H221KB	CAP,C 220PF–K–50V
C020	ECEA1EU4R7	CAP,E 4.7UF/25V
C021	ECEA0JU222	CAP,E 2200UF/6.3V
C023	ECQB1H223JF	CAP,P .022UF–J–50V
C024	ECKF1H103ZF	CAP,C .01UF–Z–50V
C026	ECCF1H330JP	CAP,C 33PF–J–50V
C027	ECCF1H330JP	CAP,C 33PF–J–50V
C030	ECEA1CN100S	CAP,E 10UF/16V
		CT–27XF12CTC
C031	ECQB1H223JF	CAP,P .022UF–J–50V
C032	ECQB1H223JF	CAP,P .022UF–J–50V
C035	ECEA0JU221	CAP,E 220UF/6.3V
C036	ECEA6Z220	CAP,E 22UF/6V
		CT–2742SFTM
C037	ECEA1CFS470	CAP,E 47UF/16V
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
C038	ECKF1H101KB	CAP,C 100PF–K–50V
C040	ECKF1H101KB	CAP,C 100PF–K–50V
C041	ECKF1H101KB	CAP,C 100PF–K–50V
C042	ECKF1H101KB	CAP,C 100PF–K–50V
C045	ECKF1H392KB	CAP,C .0039–K–50V
C060	ECKF1H392KB	CAP,C .0039–K–50V
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
C070	ECCF1H221KB	CAP,C 220PF–K–50V
		CT–27XF12CTC
C071	ECEA0JU101	CAP,E 100UF/6.3V
C075	ECKF1H103KB	CAP,C .01UF–K–50V
		CT–27XF12CTC
C076	ECKF1H101KB	CAP,C 100PF–K–50V
		CT–27XF12CTC
C080	ECKF1H103ZF	CAP,C .01UF–Z–50V
C081	ECKF1H103ZF	CAP,C .01UF–Z–50V
C082	ECKF1H101KB	CAP,C 100PF–K–50V
C100	ECKF1H103ZF	CAP,C .01UF–Z–50V
C101	ECKF1H103ZF	CAP,C .01UF–Z–50V
C102	ECKF1H103ZF	CAP,C .01UF–Z–50V
C103	ECEA1CKA330	CAP,E 33UF/16V
C104	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C105	ECEA1HFSR22	CAP,E .22UF/50V
C106	ECUX1H220JCX	CAP,C 22PF–J–50V
C107	ECUX1H471JCX	CAP,C 470PF–J–50V
C108	ECQB1H333KF	CAP,P .033UF–K–50V
C109	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C110	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C111	ECEA1HFSR47	CAP,E .47UF/50V
C112	ECUX1H390JCX	CAP,C 39PF–J–50V
C113	ECUX1H392KBX	CAP,C .0039UF–K–50V
C115	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C116	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C119	ECUX1H270JCX	CAP,C 27PF–J–50V
C120	ECEA1CU220	CAP,E 22UF/16V
C122	ECKF1H122KB	CAP,C .0012UF–K–50V
C135	ECUX1H270JCX	CAP,C 27PF–J–50V
C151	ECUX1H820JCX	CAP,C 82PF–J–50V
C152	ECUX1H120JCX	CAP,C 12PF–J–50V
C153	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C154	ECEA1HKAR22	CAP,E .22UF/50V
C155	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C201	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C202	ECEA1EKA4R7	CAP,E 4.7UF/25V
C203	ECUX1H680JCX	CAP,C 68PF–J–50V
C204	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C205	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C301	ECEA1CN330S	CAP,E 33UF/16V
C302	ECEA1HU010	CAP,E 1UF/50V
C304	ECEA1HU010	CAP,E 1UF/50V
C305	ECQB1H103JF	CAP,P .01UF–J–50V
C306	ECEA1CU220	CAP,E 22UF/16V
C307	ECQB1H223KF	CAP,P .022UF–K–50V
C308	ECEA1HU3R3	CAP,E 3.3UF/50V
C309	ECEA1HN010S	CAP,E 1UF/50V
C310	ECCF1H390JC	CAP,C 39PF–J–50V
C311	ECKF1H103ZF	CAP,C .01UF–Z–50V
C312	ECEA1CU100	CAP,E 10UF/16V
C313	ECEA1CU331	CAP,E 330UF/16V
C314	ECEA1CU470	CAP,E 47UF/16V
C315	ECEA1AU220	CAP,E 22UF/10V
C316	ECEA1EU4R7	CAP,E 4.7UF/25V
C317	ECEA1EU4R7	CAP,E 4.7UF/25V
C318	ECKF1H103ZF	CAP,C .01UF–Z–50V
C319	ECEA1HU010	CAP,E 1UF/50V
C321	ECKF1H103ZF	CAP,C .01UF–Z–50V
C351	ECKD3D102KB	CAP,C .001UF–K–2KV
C352	ECEA1HN010S	CAP,E 1UF/50V
C353	ECKF1H681KB	CAP,C 680PF–K–50V
C354	ECKF1H681KB	CAP,C 680PF–K–50V
C355	ECKF1H561KB	CAP,C 560PF–K–50V
C356	ECEA1CU100	CAP,E 10UF/16V
C357	ECKD2H821KB	CAP,C 820PF–K–500V
C364	ECEA1CU100	CAP,E 10UF/16V
C365	ECKF1H102KB	CAP,C .001UF–K–50V
C366	ECKD2H332KB	CAP,C .0033UF–K–500V

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
C370	ECKD2H821KB	CAP,C 820PF–K–500V
C371	ECEA1CU100	CAP,E 10UF/16V
C372	ECCF1H470J	CAP,C 47PF–J–50V
C373	ECCF1H470J	CAP,C 47PF–J–50V
C374	ECCF1H470J	CAP,C 47PF–J–50V
C401	ECQB1H333KF	CAP,P .033UF–K–50V
C402	ECSF1EE105	CAP,T 1.0UF/25V
C403	ECSF1VE334	CAP,T .33UF/35V
C407	ECEA1CU470	CAP,E 47UF/16V
C451	ECEA1HGE2R2	CAP,E 2.2UF/50V
C452	ECQB1H473KF	CAP,P .047UF–K–50V
C453	ECEA1VU221	CAP,E 220UF/35V
C454	ECEA1VU221	CAP,E 220UF/35V
C455	ECEA1VU222	CAP,E 2200UF/35V
C457	ECEA1CU101	CAP,E 100UF/16V
C458	ECQM1104JZ	CAP,P .1UF–J–100V
C461	ECEA1AU330	CAP,E 33UF/10V
C462	ECEA1HU010	CAP,E 1UF/50V
C501	ECQB1H182KF	CAP,P .0018UF–K–50V
C502	ECQB1H333KF	CAP,P .033UF–K–50V
C503	ECEA1EU4R7	CAP,E 4.7UF/25V
C504	ECCF1H221JU	CAP,C 220PF–J–50V
C505	ECQB1H563KF	CAP,P .056UF–K–50V
C506	ECEA1EU4R7	CAP,E 4.7UF/25V
C510	ECCF1H820J	CAP,C 82PF–J–50V
C511	ECKD2H122KB	CAP,C .0012UF–K–500V
C514	ECKD2H821KB	CAP,C 820PF–K–500V
C531	ECEA1HU330	CAP,E 33UF/50V
C532	ECKF1H103ZF	CAP,C .01UF–Z–50V
C551	**ECWH12H103JS**	**CAP,P .01UF–J–1.2KV**
C552	**ECQM4333JZ**	**CAP,P .033UF–J–400V**
C554	**ECKD3D821JB**	**CAP,C 820PF–J–2KV**
C555	**ECWH12H472JS**	**CAP,P .0047UF–J–1.2KV**
C556	**ECKD3D561JB**	**CAP,C 560PF–J–2KV**
C557	ECKD3D471JB	CAP,C 470PF–J–2KV
C558	**ECKD3D821JB**	**CAP,C 820PF–J–2KV**
C559	**ECQF2H434JS**	**CAP,P .43UF–J–200V**
C560	**ECQM1333JZ**	**CAP,P .033UF–J–100V**
C562	ECEA1VU471	CAP,E 470UF/35V
C563	**ECEA2CU4R7**	**CAP,E 4.7UF/160V**
C564	ECEA2EU220	CAP,E 22UF/250V
C565	ECKD2H561KB	CAP,C 560PF–K–500V
C566	ECKD2H561KB	CAP,C 560PF–K–500V
C567	**ECKD3D471JB**	**CAP,C 470PF–J–2KV**
C569	**ECEA160V33Z**	**CAP,E 33UF/160V**
C601	ECKF1H103ZF	CAP,C .01UF–Z–50V
C605	ECQB1H103KF	CAP,P .01UF–K–50V
C606	ECEA1HN2R2S	CAP,E 2.2UF/50V
C607	ECCF1H090DC	CAP,C 9PF–D–50V
C608	ECEA1HKNR33	CAP,E .33UF/50V
C609	ECEA1HKNR33	CAP,E .33UF/50V
C610	ECEA1HUR33	CAP,E .33UF/50V
C611	ECEA1HUR33	CAP,E .33UF/50V
C612	ECEA1HUR33	CAP,E .33UF/50V
C614	ECQB1H104KF	CAP,P .1UF–K–50V
C615	ECCF1H330JC	CAP,C 33PF–J–50V
C616	ECKF1H103ZF	CAP,C .01UF–Z–50V
C753	ECEA1VU470	CAP,E 47UF/35V
C756	ECQE1395KN	CAP,P .068UF–K–100V
C778	ECQF2274JZA	CAP,P .27UF–J–200V
C801	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C802	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C803	**ECKD2H472PU**	**CAP,C .0047UF–P–500V**
C805	**ECQU2A104MN**	**CAP,P .01UF–M–250VAC**
C806	**ECES2DG331MG**	**CAP,E 330/200V**
C807	ECEA1EU220	CAP,E 22UF/25V
C811	ECQB1H102JF	CAP,P .001UF–J–50V
C812	ECKD3A472KB	CAP,C .0047UF–K–1KV
C815	ECQB1H393KF	CAP,P .039UF–K–50V
C816	ECEA1HGE101	CAP,E 100UF/50V
C817	ECKD3A102KB	CAP,C .001UF–K–1KV
C818	**ECES2DU221E4**	**CAP,E 220UF/200V**
C820	ECKD2H391KB	CAP,C 390PF–K–500V
C821	**ECEA1EU102**	**CAP,E 1000UF/25V**
C826	**ECEA1CU332**	**CAP,E 3300UF/16V**
C828	**ECKCNS472ME**	**CAP,C .0047UF–M–125VAC**
C829	**ECKCNS472ME**	**CAP,C .0047UF–M–125VAC**
C830	ECEA1CU100	CAP,E 10UF/16V
C831	ECEA1CFS331	CAP,E 330UF/16V
C833	ECQB1H683KF	CAP,P .068UF–K–50V
C835	ECKD3D471KB	CAP,C 470PF–K–2KV
C836	ECKF1H681KB	CAP,C 680PF–K–50V
C838	ECKF1H681KB	CAP,C 680PF–K–50V
C842	ECQB1H103JF	CAP,P .01UF–J–50V
C844	ECKF1H221KB	CAP,C 220PF–K–50V
C845	ECKF1H103ZF	CAP,C .01UF–Z–50V
C847	ECKF1H151KB	CAP,C 150PF–K–50V
C848	ECEA1HFSR22	CAP,E .22UF/50V
C856	ECQB1H104KF	CAP,P .1UF–K–50V
C859	ECEA1CU471	CAP,E 470UF/16V
C860	ECKF1H103ZF	CAP,C .01UF–Z–50V
C861	ECEA1CU100	CAP,E 10UF/16V
C863	ECKD2H471KB	CAP,C 470PF–K–500V
C865	ECKD2H471KB	CAP,C 470PF–K–500V
C868	**ECKD2H471KB**	**CAP,C 470PF–K–500V**
C870	**ECKCNS472ME**	**CAP,C .0047UF–M–125VAC**
C871	**ECKCNS472ME**	**CAP,C .0047UF–M–125VAC**
C880	ECEA0JU101	CAP,E 100UF/6.3V
C881	ECKF1H103ZF	CAP,C .01UF–Z–50V
C890	ECEA1CU471	CAP,E 470UF/16V
C899	ECKF1H821KB	CAP,C 820PF–K–50V
C901	ECEA1CN100S	CAP,E 10UF/16V CT–27XF12CTC
C902	ECCF1H271K	CAP,C 270PF–K–50V CT–27XF12CTC
C903	ECEA1CU220	CAP,E 22UF/16V CT–27XF12CTC
C904	ECKF1H103ZF	CAP,C .01UF–Z–50V CT–27XF12CTC
C909	ECCF1H680J	CAP,C 68PF–J–50V CT–27XF12CTC
C953	ECKF1H103MD	CAP,C .01UF–M–50V

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
		CT–27XF12CTC
C954	ECQB1H823KF	CAP,P .082UF–K–50V
		CT–27XF12CTC
C958	**ECEA2CU100**	**CAP,E 10UF/160V**
		CT–27XF12CTC
C959	ECKD2H472MD	CAP,C .0047UF–M–500V
		CT–27XF12CTC
C961	ECEA2AU100	CAP,E 10UF/100V
		CT–27XF12CTC
C962	ECKD2H472MD	CAP,C .0047UF–M–500V
		CT–27XF12CTC
C964	ECEA0JU101	CAP,E 100UF/6.3V
		CT–27XF12CTC
C966	ECEA0JU101	CAP,E 100UF/6.3V
		CT–27XF12CTC
C967	ECEA1AU331	CAP,E 330UF/10V
		CT–27XF12CTC
C970	ECCD2H151J	CAP,C 150PF–J–500V
		CT–27XF12CTC
C971	ECCF1H151K	CAP,C 150PF–K–50V
		CT–27XF12CTC
C2201	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2202	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2203	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2204	ECQB1H104JF	CAP,P .1UF–J–50V
C2205	ECEA1HUR68	CAP,E .68UF/50V
C2206	ECEA1CKA101	CAP,E 100UF/16V
C2207	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2208	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2209	AP106K016CAE	CAP,T 10UF/16V
C2210	ECQB1H104JF	CAP,P .1UF–J–50V
C2211	AP335K016CAE	CAP,T 3.3UF/16V
C2212	ECEA1HKA010	CAP,E 1.0UF/50V
C2213	ECEA1HKAR47	CAP,E .47UF/50V
C2214	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2215	ECQB1H104JF	CAP,P .1UF–J–50V
C2216	ECQB1H102JF	CAP,P .001UF–J–50V
C2217	ECQB1H683JF	CAP,P .068UF–J–50V
C2218	ECUX1H222KBX	CAP,C .0022UF–K–50V
C2219	ECQB1H103JF	CAP,P .01UF–J–50V
C2220	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2229	ECEA1EKA4R7	CAP,E 4.7UF/25V
C2230	ECQB1H184JF	CAP,P .18UF–J–50V
C2301	ECEA1EU101	CAP,E 100UF/25V
C2302	ECEA1HU010	CAP,E 1UF/50V
C2303	ECKF1H392KB	CAP,C .0039–K–50V
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
C2303	ECKF1H472KB	CAP,C .0047UF–K–50V
		CT–27XF12CTC
C2303	ECKF1H682KB	CAP,C .0068UF–K–50V
		CT–2742SFTM
C2304	ECKF1H392KB	CAP,C .0039–K–50V
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
C2304	ECKF1H472KB	CAP,C .0047UF–K–50V

REF. NO.	PART NO.	DESCRIPTION
		CT–27XF12CTC
C2304	ECKF1H682KB	CAP,C .0068UF–K–50V
		CT–2742SFTM
C2305	ECEA1HU010	CAP,E 1UF/50V
C2306	ECEA1EU101	CAP,E 100UF/25V
C2307	ECEA1CU102	CAP,E 1000UF/16V
C2308	ECEA1EU470	CAP,E 47UF/25V
C2309	ECQB1H104KF	CAP,P .1UF–K–50V
C2310	ECQB1H104KF	CAP,P .1UF–K–50V
C2311	ECEA1EU470	CAP,E 47UF/25V
C2312	ECEA1CU102	CAP,E 1000UF/16V
C2313	ECEA1EU102	CAP,E 1000UF/25V
C2314	ECEA1HU010	CAP,E 1UF/50V
C2315	ECEA1EU100	CAP,E 10UF/25V
C2318	ECKF1H332KB	CAP,C .0033UF–K–50V
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
C2319	ECKF1H332KB	CAP,C .0033UF–K–50V
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
C2320	ECKF1H101KB	CAP,C 100PF–K–50V
C2321	ECEA1HU4R7	CAP,E 4.7UF/50V
C2322	ECEA1HN010S	CAP,E 1UF/50V
C2323	ECQB1H103KF	CAP,P .01UF–K–50V
C2324	ECQB1H683KF	CAP,P .068UF–K–50V
C2325	ECEA1HU010	CAP,E 1UF/50V
C2326	ECEA1CU470	CAP,E 47UF/16V
C2327	ECQB1H683KF	CAP,P .068UF–K–50V
C2328	ECQB1H103KF	CAP,P .01UF–K–50V
C2329	ECEA1CU470	CAP,E 47UF/16V
C2330	ECEA1HN010S	CAP,E 1UF/50V
C2333	ECEA1CU100	CAP,E 10UF/16V
C2334	ECEA1CU100	CAP,E 10UF/16V
C2335	ECEA1CU100	CAP,E 10UF/16V
C2351	ECEA1AU470	CAP,E 47UF/10V
C2352	ECEA1CU100	CAP,E 10UF/16V
C2353	ECEA1CU100	CAP,E 10UF/16V
C2354	ECEA1HU010	CAP,E 1UF/50V
C2355	ECEA1HU010	CAP,E 1UF/50V
C2356	ECEA1HU010	CAP,E 1UF/50V
C2357	ECEA1HU010	CAP,E 1UF/50V
C2358	ECKF1H103ZF	CAP,C .01UF–Z–50V
C2381	ECEA1HU4R7	CAP,E 4.7UF/50V
C2382	ECEA1HU4R7	CAP,E 4.7UF/50V
C2383	ECEA1HU100	CAP,E 10UF/50V
C2384	ECEA1HU100	CAP,E 10UF/50V
C2385	ECEA1HU4R7	CAP,E 4.7UF/50V
C3001	ECEA1HKA010	CAP,E 1.0UF/50V
C3002	ECEA1HKA010	CAP,E 1.0UF/50V
C3003	ECEA1HKN010	CAP,E 1.0UF/50V
C3004	ECEA1HKA010	CAP,E 1.0UF/50V
C3005	ECEA1HKA010	CAP,E 1.0UF/50V
C3006	ECEA1HKN010	CAP,E 1.0UF/50V
C3007	ECUX1H103ZFX	CAP,C .01UF–Z–50V

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
C3008	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3009	ECEA1CKA470	CAP,E 47UF/16V
C3010	ECEA1CKA101	CAP,E 100UF/16V
C3011	ECEA1CKA100	CAP,E 10UF/16V
C3012	ECEA1CKA100	CAP,E 10UF/16V
C3015	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3016	ECEA1CKA100	CAP,E 10UF/16V
C3017	ECEA1CU100	CAP,E 10UF/16V
C3018	ECEA1CKA100	CAP,E 10UF/16V
C3201	ECEA1CKA470	CAP,E 47UF/16V
C3202	ECQB1H473JF	CAP,P .047UF–J–50V
C3203	ECQB1H103JF	CAP,P .01UF–J–50V
C3204	ECEA1CKA220	CAP,E 22UF/16V
C3206	ECQB1H103JF	CAP,P .01UF–J–50V
C3207	ECUX1H680JCX	CAP,C 68PF–J–50V
C3208	ECUX1H101JCX	CAP,C 100PF–J–50V
C3209	ECEA1CKA470	CAP,E 47UF/16V
C3210	ECUX1H220JCX	CAP,C 22PF–J–50V
C3212	ECUX1H820JCX	CAP,C 82PF–J–50V
C3213	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3214	ECUX1H103ZFX	CAP,C .01UF–Z–50V
C3215	ECUX1H820JCX	CAP,C 82PF–J–50V
C3216	ECUX1H102KBX	CAP,C .001UF–K–50V
C3251	ECUX1H470JCX	CAP,C 47PF–J–50V
C3252	ECUX1H470JCX	CAP,C 47PF–J–50V
C3253	ECUX1H100DCX	CAP,C 10PF–D–50V
C3254	ECUX1H120JCX	CAP,C 12PF–J–50V
		DIODES
D001	ERA15–01	DIODE
D002	MA165	DIODE
D003	MA4062M	DIODE, ZENER
		CT–2742SFTM CT–27XF12CTC
D005	MA4110	DIODE, ZENER
D006	MA165	DIODE
D008	MA1047L	DIODE, ZENER
D009	MA4051M	DIODE, ZENER
D010	MA165	DIODE
D011	SEL1410G	DIODE, LED
D012	MA165	DIODE
D013	MA165	DIODE
D014	MA165	DIODE
D015	MA165	DIODE
D016	MA165	DIODE
D020	MA4062M	DIODE, ZENER
D021	MA4062M	DIODE, ZENER
D070	MA165	DIODE
		CT–27XF12CTC
D075	MA700	DIODE
		CT–27XF12CTC
D076	MA165	DIODE
		CT–27XF12CTC
D080	MA165	DIODE
D301	MA165	DIODE
D366	MA165	DIODE
D367	MA4056H	DIODE, ZENER
D451	MA165	DIODE
D455	TVSEM1Z	DIODE
D501	MA165	DIODE
D502	MA4047M	DIODE, ZENER
D504	MA165	DIODE
D530	MA4039H	DIODE, ZENER
D531	ERA22–04	DIODE, ZENER
D532	**MA1062L**	**DIODE, ZENER**
D551	AS01	DIODE
D552	ERD07–15	DIODE
D553	TVSRU3N	DIODE
D554	AU02	DIODE
D555	MA171	DIODE
D556	MA165	DIODE
D753	MA165	DIODE
D801	**TVSRM10B**	**DIODE**
D802	**TVSRM10B**	**DIODE**
D803	**TVSRM10B**	**DIODE**
D804	**TVSRM10B**	**DIODE**
D805	MA1100M	DIODE, ZENER
D806	MA150	DIODE
D807	MA165	DIODE
D808	AU02Z	DIODE
D811	**RU30LF–S1**	**DIODE**
D813	**RU2YX**	**DIODE**
D816	TVSSR2KL	DIODE
D817	**AU02Z**	**DIODE**
D818	MA165	DIODE
D819	MA165	DIODE
D821	**RU2YX**	**DIODE**
D827	MA4220M	DIODE, ZENER
D828	AS01	DIODE
D850	**TRPW5B0M030D**	**THERMISTOR**
D902	MA700	DIODE
		CT–27XF12CTC
D954	MA165	DIODE
		CT–27XF12CTC
D955	MA29WBA	DIODE
		CT–27XF12CTC
D957	MA165	DIODE
		CT–27XF12CTC
D2315	MA165	DIODE
D2320	MA165	DIODE
D2321	MA165	DIODE
D2381	MA151K	DIODE
D3001	MA3091	DIODE
D3002	MA3091	DIODE
D3007	MA151K	DIODE
D3008	MA151K	DIODE
		FUSES
F801	**0BA1C63NU100**	**FUSE (6.3A–125V)**
		INTEGRATED CIRCUITS
IC001	MN1873234HYF	INT CKT
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
IC001	MN1873234QAP	INT CKT

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
		CT–2742SFTM
IC002	24LC02BIP	INT CKT
IC101	AN5179K	VIF SIF AFC & DET
IC301	**AN5307K**	**INT CKT**
IC451	LA7845	INT CKT
IC801	**STR–S6302**	**POWER IC**
IC803	AN78M09	PLUS 9V AVR
IC804	**SE140N**	**ERROR AMPLIFIER**
IC806	**TLP621GR**	**PHOTO COUPLER**
IC846	AN78N05	INT CKT
IC1051	0NQ1406	RECEIVER, REMOTE CTRL.
		CT–2742SFTM
IC2201	AN5817NK	INT CKT
IC2301	AN7147N	INT CKT
IC2302	CXA1279AS	INT CKT
IC2351	BA15218N	INT CKT
IC2381	AN5285K	INT CKT
IC3001	M52472P	INT CKT
IC3002	LA7222–TV	INT CKT
		COILS
DY	**0LY15901F**	**YOKE, DEFLECTION**
DEG	0LK19045A	COIL, DEGAUSSING 27"
L005	TLUABTA100K	COIL, PEAKING 10UH
L006	TLUABTA100K	COIL, PEAKING 10UH
L007	TLUABTA100K	COIL, PEAKING 10UH
L008	TLUABTA100K	COIL, PEAKING 10UH
L011	ELESN390KA	COIL, PEAKING 39UH
L012	EXCELSA35	FERRITE BEAD
L015	TLUABTA100K	COIL, PEAKING 10UH
L016	TLUABTA100K	COIL, PEAKING 10UH
L017	TLUABTA100K	COIL, PEAKING 10UH
L018	TLUABTA390K	COIL, PEAKING 39UH
L022	EXCELSA35	FERRITE BEAD
		CT–2742SFTM CT–27XF12CTC
L025	ELESN100KA	COIL, PEAKING 10UH
		CT–2742SFTM
L103	ELESN150KA	COIL, PEAKING 15UH
L105	EIV7EN068B	COIL, VCO
L108	ELESN330JA	COIL, PEAKING 33UH
L118	ELESN1R0KA	COIL, PEAKING 1.0UH
L135	ELESN560JA	COIL, 56UH
L152	EIV7EN041B	COIL, AFT
L201	EIS7ES004B	COIL, QUADRATURE
L202	TLQ012K205C	COIL, PEAKING 1.2UH
L351	EXCELSA35	FERRITE BEAD
L451	EXCELSA35	FERRITE BEAD
L452	ELC08D067	COIL, POWER
L551	TLH6618P	COIL, LINEARITY
L553	EXCELSA24	FERRITE BEAD
L554	EXCELSA35	FERRITE BEAD
L556	EXCELSA35	FERRITE BEAD
L601	TLUABTA820K	COIL, PEAKING 82UH
L603	EXCELSA35	FERRITE BEAD
L751	**TLH15733M**	**COIL, TOP/BOTTOM PHASING**
L770	**ELH11Y751**	**COIL, PINCUSHION**
L801	**ELF18D656Y**	**CHOKE, AC LINE**
L802	**ELF18D656Y**	**CHOKE, AC LINE**
L804	EXCELSA35	FERRITE BEAD
L805	EXCELSA35	FERRITE BEAD
L806	EXCELSA35	FERRITE BEAD
L807	EXCELSA35	FERRITE BEAD
L808	EXCELSA35	FERRITE BEAD
L809	EXCELSA39	FERRITE BEAD
L812	ELC10B011	POWER SUPPLY FILTER
L814	0LK19045A	COIL, DEGAUSSING 27"
		CT–2742SFTM CT–27SF12TM
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
L822	EXCELSA35	FERRITE BEAD
L823	EXCELSA35	FERRITE BEAD
L824	EXCELSA35	FERRITE BEAD
L826	EXCELSA35	FERRITE BEAD
L901	ELESN330KA	COIL, PEAKING 33UH
		CT–27XF12CTC
L951	ELESN150KA	COIL, PEAKING 15UH
		CT–27XF12CTC
L953	EXCELSA35	FERRITE BEAD
		CT–27XF12CTC
L954	EXCELSA35	FERRITE BEAD
		CT–27XF12CTC
L955	EXCELSA35	FERRITE BEAD
		CT–27XF12CTC
L958	EXCELSA35	FERRITE BEAD
		CT–27XF12CTC
L2302	EXCELSA35	FERRITE BEAD
L2303	ELESN101KA	COIL, PEAKING 100UH
L2304	ELESN1R5KA	COIL, 1.5UH
L3201	EFDEN645B35B	DELAY LINE
L3202	EIK1EG024B	DELAY LINE
L3203	EIK1EG025Q	DELAY LINE
L3204	ELESN120KA	COIL, PEAKING 12UH
L3251	ELESN270KA	COIL, PEAKING 27UH
L3252	ELESN390KA	COIL, PEAKING 39UH
L3253	ELESN820KA	COIL, PEAKING 82UH
		TRANSISTORS
Q003	JA101PQ	TRANSISTOR
Q006	JC501PQ	TRANSISTOR
Q007	JC501PQ	TRANSISTOR
Q008	JA101PQ	TRANSISTOR
Q009	JC501PQ	TRANSISTOR
Q010	JA101PQ	TRANSISTOR
Q011	JA101PQ	TRANSISTOR
Q012	JA101PQ	TRANSISTOR
Q013	JC501PQ	TRANSISTOR
Q014	JC501PQ	TRANSISTOR
Q015	JA101PQ	TRANSISTOR
Q016	JC501PQ	TRANSISTOR
Q017	JC501PQ	TRANSISTOR
Q018	JC501PQ	TRANSISTOR
Q020	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q021	JC501PQ	TRANSISTOR

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
		CT–27XF12CTC
Q022	JC501PQ	TRANSISTOR
Q023	JC501PQ	TRANSISTOR
Q024	JC501PQ	TRANSISTOR
Q072	JC501PQ	TRANSISTOR
Q073	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q074	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q075	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q108	MSB709R	TRANSISTOR
Q302	JA101PQ	TRANSISTOR
Q303	JA101PQ	TRANSISTOR
Q304	JC501PQ	TRANSISTOR
Q307	JA101PQ	TRANSISTOR
Q351	2SC3063	TRANSISTOR
Q352	2SC3063	TRANSISTOR
Q353	2SC3063	TRANSISTOR
Q354	JC501PQ	TRANSISTOR
Q355	JC501PQ	TRANSISTOR
Q356	JC501PQ	TRANSISTOR
Q363	JA101PQ	TRANSISTOR
Q451	JA101PQ	TRANSISTOR
Q501	2SC4212H	TRANSISTOR
Q551	**2SD1556MA**	**TRANSISTOR**
Q752	JA101PQ	TRANSISTOR
Q753	2SD1267APQ	TRANSISTOR
Q754	JA101PQ	TRANSISTOR
Q755	JC501PQ	TRANSISTOR
Q756	JC501PQ	TRANSISTOR
Q757	JA101PQ	TRANSISTOR
Q801	JA101PQ	TRANSISTOR
Q802	JC501PQ	TRANSISTOR
Q805	2SA879Q	TRANSISTOR
Q901	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q902	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q903	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q951	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q952	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q953	JC501PQ	TRANSISTOR
		CT–27XF12CTC
Q954	JA101PQ	TRANSISTOR
		CT–27XF12CTC
Q955	2SB940P	TRANSISTOR
		CT–27XF12CTC
Q956	2SD1264P	TRANSISTOR
		CT–27XF12CTC
Q2301	JC501PQ	TRANSISTOR
Q2302	JA101PQ	TRANSISTOR
Q2340	JC501PQ	TRANSISTOR

REF. NO.	PART NO.	DESCRIPTION
Q2341	JA101PQ	TRANSISTOR
Q2351	JC501PQ	TRANSISTOR
Q2352	JA101PQ	TRANSISTOR
Q2354	JC501PQ	TRANSISTOR
Q2355	JC501PQ	TRANSISTOR
Q3009	MSD601R	TRANSISTOR
Q3010	MSD601R	TRANSISTOR
Q3011	MSB709R	TRANSISTOR
Q3012	MSD601R	TRANSISTOR
Q3201	MSD601R	TRANSISTOR
Q3202	MSD601R	TRANSISTOR
Q3203	MSD601R	TRANSISTOR
Q3205	MSD601R	TRANSISTOR
Q3207	MSB709R	TRANSISTOR
Q3208	MSD601R	TRANSISTOR
Q3209	MSD601R	TRANSISTOR
Q3210	MSD601R	TRANSISTOR
Q3251	MSD601R	TRANSISTOR
Q3252	MSB709R	TRANSISTOR
Q3253	MSD601R	TRANSISTOR
Q3254	MSD601R	TRANSISTOR
Q3255	MSD601R	TRANSISTOR
Q3256	MSD601R	TRANSISTOR
		RELAYS
RL001	**TSE1864**	**RELAY**
		RESISTORS
R001	ERD25TJ101	RES,C 100–J–1/4
R002	ERDS2TJ101	RES,C 100–J–1/4
		CT–27XF12CTC
R003	ERDS2TJ102	RES,C 1K–J–1/4
		CT–27XF12CTC
R004	ERDS1TJ221	RES,C 220–J–1/2
R005	ERDS2TJ822	RES,C 8.2K–J–1/4
R006	ERDS2TJ223	RES,C 22K–J–1/4
R007	ERDS2TJ223	RES,C 22K–J–1/4
R008	ERDS2TJ103	RES,C 10K–J–1/4
R009	ERDS2TJ393	RES,C 39K–J–1/4
R010	ERDS2TJ473	RES,C 47K–J–1/4
R011	ERDS2TJ561	RES,C 560–J–1/4
R012	ERDS2TJ561	RES,C 560–J–1/4
R013	ERDS2TJ223	RES,C 22K–J–1/4
R014	ERDS2TJ123	RES,C 12K–J–1/4
R015	ERDS2TJ332	RES,C 3.3K–J–1/4
R016	ERDS2TJ562	RES,C 5.6K–J–1/4
R017	ERDS2TJ102	RES,C 1K–J–1/4
R018	ERDS2TJ302	RES,C 3K–J–1/4
R019	ERDS2TJ121	RES,C 120–J–1/4
R020	ERDS2TJ822	RES,C 8.2K–J–1/4
		CT–27XF12CTC
R021	ERDS2TJ103	RES,C 10K–J–1/4
R022	ERDS2TJ161	RES,C 160K–J–1/4
		CT–2742SFTM CT–27XF12CTC
R022	ERDS2TJ331	RES,C 330–J–1/4
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
R023	ERDS2TJ103	RES,C 10K–J–1/4

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
R024	ERDS2TJ152	RES,C 1.5K–J–1/4
		CT–27XF12CTC
R025	ERDS2TJ102	RES,C 1K–J–1/4
R026	ERDS2TJ102	RES,C 1K–J–1/4
R027	ERD25TJ103	RES,C 10K–J–1/4
R028	ERD25TJ103	RES,C 10K–J–1/4
R029	ERDS2TJ822	RES,C 8.2K–J–1/4
R030	ERDS2TJ182	RES,C 1.8K–J–1/4
R031	ERDS2TJ182	RES,C 1.8K–J–1/4
R032	ERDS2TJ103	RES,C 10K–J–1/4
R033	ERD25TJ103	RES,C 10K–J–1/4
R034	ERD25TJ682	RES,C 6.8K–J–1/4
R035	ERDS2TJ182	RES,C 1.8K–J–1/4
R036	ERDS2TJ682	RES,C 6.8K–J–1/4
R037	ERDS2TJ682	RES,C 6.8K–J–1/4
R038	ERDS2TJ273	RES,C 27K–J–1/4
R039	ERDS2TJ182	RES,C 1.8K–J–1/4
R040	ERDS2TJ153	RES,C 15K–J–1/4
		CT–27XF12CTC
R041	ERDS2TJ102	RES,C 1K–J–1/4
R042	ERDS2TJ474	RES,C 470K–J–1/4
R043	ERDS2TJ562	RES,C 5.6K–J–1/4
R044	ERDS2TJ562	RES,C 5.6K–J–1/4
R045	ERDS2TJ562	RES,C 5.6K–J–1/4
R046	ERDS2TJ333	RES,C 33K–J–1/4
R047	ERDS2TJ182	RES,C 1.8K–J–1/4
R048	ERDS2TJ223	RES,C 22K–J–1/4
R049	ERDS2TJ392	RES,C 3.9K–J–1/4
R050	ERDS2TJ102	RES,C 1K–J–1/4
R051	ERD25TJ102	RES,C 1K–J–1/4
R052	ERDS2TJ102	RES,C 1K–J–1/4
R053	ERDS2TJ102	RES,C 1K–J–1/4
R054	ERDS2TJ271	RES,C 270–J–1/4
R055	ERDS2TJ102	RES,C 1K–J–1/4
R056	ERDS2TJ122	RES,C 1.2K–J–1/4
R057	ERDS2TJ122	RES,C 1.2K–J–1/4
R058	ERDS2TJ122	RES,C 1.2K–J–1/4
R059	ERD25TJ332	RES,C 3.3K–J–1/4
R060	ERD25TJ332	RES,C 3.3K–J–1/4
R061	ERDS2TJ332	RES,C 3.3K–J–1/4
R062	ERDS2TJ182	RES,C 1.8K–J–1/4
R063	ERDS2TJ102	RES,C 1K–J–1/4
R064	ERDS2TJ472	RES,C 4.7K–J–1/4
R065	ERDS2TJ472	RES,C 4.7K–J–1/4
R066	ER0S2CKF1002	RES,M 10K–F–1/4
R067	ERDS2TJ123	RES,C 12K–J–1/4
R068	ERDS2TJ103	RES,C 10K–J–1/4
R070	ERDS2TJ102	RES,C 1K–J–1/4
R071	ERDS2TJ102	RES,C 1K–J–1/4
R072	ERDS2TJ331	RES,C 330–J–1/4
		CT–27XF12CTC
R073	ERDS2TJ102	RES,C 1K–J–1/4
		CT–27XF12CTC
R074	ERDS2TJ271	RES,C 270–J–1/4
		CT–27XF12CTC
R075	ERDS2TJ331	RES,C 330–J–1/4

REF. NO.	PART NO.	DESCRIPTION
		CT–27XF12CTC
R076	ERDS2TJ102	RES,C 1K–J–1/4
		CT–27XF12CTC
R077	ERDS2TJ101	RES,C 100–J–1/4
		CT–27XF12CTC
R078	ERDS2TJ222	RES,C 2.2K–J–1/4
		CT–27XF12CTC
R079	ERDS2TJ102	RES,C 1K–J–1/4
R080	ERD25TJ222	RES,C 2.2K–J–1/4
R081	ERD25TJ222	RES,C 2.2K–J–1/4
R082	ERD25TJ332	RES,C 3.3K–J–1/4
R083	ERD25TJ512	RES,C 5.1K–J–1/4
R084	ERD25TJ912	RES,C 820K–J–1/4
R085	ERD25TJ223	RES,C 22K–J–1/4
R086	ERDS2TJ103	RES,C 10K–J–1/4
		CT–2742SFTM
R087	ERDS2TJ102	RES,C 1K–J–1/4
R088	ERDS2TJ102	RES,C 1K–J–1/4
R089	ERDS2TJ223	RES,C 22K–J–1/4
R090	ERDS2TJ391	RES,C 390–J–1/4
R091	ERDS2TJ122	RES,C 1.2K–J–1/4
R092	ERDS2TJ103	RES,C 10K–J–1/4
R093	ERDS2TJ273	RES,C 27K–J–1/4
		CT–27XF12CTC
R094	ERDS2TJ472	RES,C 4.7K–J–1/4
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
R096	ERDS2TJ182	RES,C 1.8K–J–1/4
		CT–27XF12CTC
R097	ERDS2TJ101	RES,C 100–J–1/4
		CT–27XF12CTC
R098	ERDS2TJ152	RES,C 1.5K–J–1/4
		CT–27XF12CTC
R099	ERDS2TJ103	RES,C 10K–J–1/4
		CT–27XF12CTC
R101	ERDS2TJ102	RES,C 1K–J–1/4
R102	ERDS2TJ102	RES,C 1K–J–1/4
R105	ERDS2TJ223	RES,C 22K–J–1/4
		CT–27XF12CTC
R106	ERJ6GEYJ561	RES,M 560–J–1/10
R107	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R108	ERJ6GEYJ272	RES,M 2.7K–J–1/10
R112	ERJ6GEYJ102	RES,M 1K–J–1/10
R113	ERJ6GEYJ221	RES,M 220–J–1/10
R114	ERJ6GEYJ332	RES,M 3.3K–J–1/10
R115	EVND8AA03B13	CONTROL 1K
R117	ERJ6GEYJ101	RES,M 100–J–1/10
R118	ERJ6GEYJ271	RES,M 270–J–1/10
R119	ERJ6GEYJ122	RES,M 1.2K–J–1/10
R121	ERJ6GEYJ121	RES,M 120–J–1/10
R123	ERJ6GEYJ561	RES,M 560–J–1/10
R125	ERDS2TJ562	RES,C 5.6K–J–1/4
R126	ERJ6GEYJ183	RES,M 18K–J–1/10
R127	ERJ6GEYJ391	RES,M 390–J–1/10
R128	ERJ6GEYJ683	RES,M 68K–J–1/10
R134	ERJ6GEYJ100	RES,M 10–J–1/10

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
R135	ERJ6GEYJ561	RES,M 560–J–1/10
R151	ERJ6GEYJ473	RES,M 47K–J–1/10
R152	ERJ6GEYJ473	RES,M 47K–J–1/10
R201	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R202	ERJ6GEYJ471	RES,M 470–J–1/10
R301	ERDS2TJ562	RES,C 5.6K–J–1/4
R302	ERDS2TJ102	RES,C 1K–J–1/4
R303	ERDS2TJ103	RES,C 10K–J–1/4
R304	ER0S2CKF1651	RES,M 1.65K–F–1/4
R305	ERDS2TJ473	RES,C 47K–J–1/4
R306	ERDS2TJ823	RES,C 82K–J–1/4
R307	ERDS2TJ333	RES,C 33K–J–1/4
R308	ERDS2TJ221	RES,C 220–J–1/4
R309	ERDS2TJ274	RES,C 270K–J–1/4
R311	ERDS2TJ564	RES,C 560K–J–1/4
R312	ERDS2TJ684	RES,C 680K–J–1/4
R313	ERD25TJ682	RES,C 6.8K–J–1/4
R319	ERDS2TJ822	RES,C 8.2K–J–1/4
R320	ERDS2TJ392	RES,C 3.9K–J–1/4
R324	ERDS2TJ223	RES,C 22K–J–1/4
R325	ER0S2CKF5601	RES,M 5.6K–F–1/4
R326	ERDS2TJ393	RES,C 39K–J–1/4
R327	ER0S2CKF2201	RES,M 2.2K–F–1/4
R328	ERDS2TJ682	RES,C 6.8K–J–1/4
R329	ERDS2TJ183	RES,C 18K–J–1/4
R331	ERDS2TJ221	RES,C 220–J–1/4
R347	ER0S2CKF6801	RES,M 6.8K–F–1/4
R348	ER0S2CKF3301	RES,M 3.3K–F–1/4
R349	ERDS2TJ103	RES,C 10K–J–1/4
R351	ERDS2TJ271	RES,C 270–J–1/4
R352	ERDS2TJ271	RES,C 270–J–1/4
R353	ERDS2TJ271	RES,C 270–J–1/4
R357	ERDS2TJ101	RES,C 100–J–1/4
R358	ERDS2TJ101	RES,C 100–J–1/4
R359	ERDS2TJ101	RES,C 100–J–1/4
R367	ERDS2TJ221	RES,C 220–J–1/4
R368	ERDS2TJ221	RES,C 220–J–1/4
R369	ERDS2TJ221	RES,C 220–J–1/4
R370	ERDS2TJ101	RES,C 100–J–1/4
R371	ERDS2TJ471	RES,C 470–J–1/4
R372	ERDS2TJ471	RES,C 470–J–1/4
R373	ERDS2TJ471	RES,C 470–J–1/4
R374	**ERG2ANJ103**	**RES,M 10K–J–2W**
R375	**ERG2ANJ103**	**RES,M 10K–J–2W**
R376	**ERG2ANJ103**	**RES,M 10K–J–2W**
R386	ERDS1TJ272	RES,C 2.7K–J–1/2
R387	ERDS1TJ272	RES,C 2.7K–J–1/2
R388	ERDS1TJ272	RES,C 2.7K–J–1/2
R392	ERDS1TJ561	RES,C 560–J–1/2
R393	ERQ12AJ101	RES,F 100–J–1/2
R395	ERDS1TJ394	RES,C 390K–J–1/2
R401	ERDS2TJ182	RES,C 1.8K–J–1/4
R403	ERDS2TJ102	RES,C 1K–J–1/4
R405	ERDS2TJ102	RES,C 1K–J–1/4
R406	ERDS2TJ221	RES,C 220–J–1/4
R408	ERDS2TJ333	RES,C 33K–J–1/4
R451	ERDS2TJ123	RES,C 12K–J–1/4
R452	ERDS1FJ2R7	RES,C 2.7–J–1/2
R453	ERDS2TJ123	RES,C 12K–J–1/4
R454	ERDS2TJ473	RES,C 47K–J–1/4
R455	ERDS2TJ103	RES,C 10K–J–1/4
R456	**ERG1ANJ331**	**RES,M 330–J–1W**
R457	ERDS1FJ1R5	RES,C 1.5–J–1/2
R458	ERDS1FJ2R7	RES,C 2.7–J–1/2
R460	ERDS2TJ103	RES,C 10K–J–1/4
R461	ERDS2TJ223	RES,C 22K–J–1/4
R463	ERD25FJ1R5	RES,C 1.5–J–1/4
R464	ERDS2TJ103	RES,C 10K–J–1/4
R465	ERDS2TJ683	RES,C 68K–J–1/4
R466	ERDS2TJ223	RES,C 22K–J–1/4
R468	ER0S2CKF4701	RES,M 4.7K–F–1/4
R469	ER0S2CKF1471	RES,M 1.47K–F–1/4
R501	ERDS2TJ182	RES,C 1.8K–J–1/4
R502	ERDS2TJ821	RES,C 820–J–1/4
R503	ERDS2TJ472	RES,C 4.7K–J–1/4
R504	ERD25TJ122	RES,C 1.2K–J–1/4
R506	ERDS2TJ391	RES,C 390–J–1/4
R509	ERDS2TJ684	RES,C 680K–J–1/4
R513	ERDS2TJ561	RES,C 560–J–1/4
R514	ERDS2TJ561	RES,C 560–J–1/4
R515	**ERG3SJS272**	**RES,M 2.7K–J–3W**
R516	**ERG3SJS272**	**RES,M 2.7K–J–3W**
R517	**ERG2ANJ472**	**RES,M 4.7K–J–2W**
R520	ERDS2TJ151	RES,C 150–J–1/4
R521	ER0S2CKF4701	RES,M 4.7K–F–1/4
R522	ER0S2CKF2703	RES,M 270K–F–1/4
R524	ERDS2TJ222	RES,C 2.2K–J–1/4
R525	ERDS2TJ222	RES,C 2.2K–J–1/4
R531	**ERQ14AJ470**	**RES,F 47–J–1/4**
R532	**ER0S2CKF2432**	**RES,M 24.3K–F–1/4**
R533	**ER0S2CKF2741**	**RES,M 2.74K–F–1/4**
R534	**ERDS2TJ681**	**RES,C 680–J–1/4**
R535	ERDS2TJ821	RES,C 820–J–1/4
R536	**ERDS1TJ683**	**RES,C 68K–J–1/2**
R551	ERDS2TJ103	RES,C 10K–J–1/4
R552	ERDS2TJ473	RES,C 47K–J–1/4
R553	**ERF5ZK2R2**	**RES,W 2.2–K–5W**
R554	ERDS2TJ333	RES,C 33K–J–1/4
R555	ERDS2TJ162	RES,C 1.6K–J–1/4
R556	**ERQ2CJ3R0**	**RES,F 3.0–J–2W**
R558	**ERQ1CJP102**	**RES,F 1K–J–1W**
R559	ERD25FJ1R0	RES,C 1.0–J–1/4
R560	ERD25FJ1R0	RES,C 1.0–J–1/4
R606	ERDS2TJ392	RES,C 3.9K–J–1/4
R607	ERDS2TJ331	RES,C 330–J–1/4
R608	ERDS2TJ182	RES,C 1.8K–J–1/4
R609	ERDS2TJ331	RES,C 330–J–1/4
R610	ERDS2TJ182	RES,C 1.8K–J–1/4
R611	ERDS2TJ331	RES,C 330–J–1/4
R612	ERDS2TJ182	RES,C 1.8K–J–1/4
R613	ERDS2TJ332	RES,C 3.3K–J–1/4
R614	ERDS2TJ332	RES,C 3.3K–J–1/4

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
R618	ERDS2TJ392	RES,C 3.9K–J–1/4
R620	ERDS2TJ125	RES,C 1.2MEG–J/1/4
R751	ERDS2TJ222	RES,C 2.2K–J–1/4
R752	ERD25TJ101	RES,C 100–J–1/4
R753	ERDS2TJ101	RES,C 100–J–1/4
R754	ERDS2TJ472	RES,C 4.7K–J–1/4
R755	ERDS2TJ103	RES,C 10K–J–1/4
R756	ERDS2TJ123	RES,C 12K–J–1/4
R757	ERDS2TJ682	RES,C 6.8K–J–1/4
R758	ERDS2TJ103	RES,C 10K–J–1/4
R759	ERDS2TJ103	RES,C 10K–J–1/4
R761	ERDS2TJ302	RES,C 3K–J–1/4
R762	ERDS2TJ561	RES,C 560–J–1/4
R763	ERDS2TJ272	RES,C 2.7K–J–1/4
R764	**ERQ2CJP100**	**RES,F 10–J–2W**
R786	EVN64UA00B13	CONTROL 1K
R788	ERDS2TJ101	RES,C 100–J–1/4
R795	**ERG1ANJ332**	**RES,M 3.3K–J–1W**
R803	ERDS1TJ823	RES,C 82K–J–1/2
R804	**ERG5SJ680**	**RES,M 68–J–5W**
R805	**ERG2ANJ390**	**RES,M 39–J–2W**
R807	ERDS2TJ333	RES,C 33K–J–1/4
R809	ER0S2CKF1403	RES,M 140K–F–1/4
R810	ERD25FJ100	RES,C 10–J–1/4
R811	**ERQ12HKR47**	**RES,F .47–K–1/2**
R812	**ERF5ZJ120**	**RES,W 12–J–5W**
R813	ERC12ZGK825	RES,S 8.2MEG–K–1/2
R814	ER025CKF1002	RES,M 10K–F–1/4
R815	**ERW12VKR18**	**RES,W .18–K–1/2**
R817	ERDS2TJ392	RES,C 3.9K–J–1/4
R818	ERDS2TJ473	RES,C 47K–J–1/4
R820	**ERW12VKR18**	**RES,W .18–K–1/2**
R822	**ERQ12HKR22**	**RES,F .22–K–1/2**
R823	**ERG2ANJ180**	**RES,M 18–J–2W**
R824	ERDS2TJ102	RES,C 1K–J–1/4
R826	ERDS1FJ221	RES,C 220–J–1/2
R827	ERDS2TJ392	RES,C 3.9K–J–1/4
R828	**ERQ1CKPR39**	**RES,F .39–K–1W**
R830	**ERQ2CJP150**	**RES,F 15–J–2W**
R832	ERDS1TJ473	RES,C 47K–J–1/2
R837	ERDS1FJ1R0	RES,C 1.0–J–1/2
R838	ERDS1FJ1R0	RES,C 1.0–J–1/2
R839	ERDS2TJ124	RES,C 120K–J–1/4
R840	ERDS2TJ682	RES,C 6.8K–J–1/4
R841	ERD25FJ822	RES,C 8.2K–J–1/4
R853	**ERG1ANJ430**	**RES,M 43–J–1W**
R890	**ERF5ZK1R5**	**RES,W 1.5–K–5W**
R891	**ERF5AK1R8**	**RES,W 1.8–K–5W**
R901	ERDS2TJ681	RES,C 680–J–1/4 CT–27XF12CTC
R902	ERDS2TJ222	RES,C 2.2K–J–1/4 CT–27XF12CTC
R903	ERDS2TJ123	RES,C 12K–J–1/4 CT–27XF12CTC
R904	ERDS2TJ562	RES,C 5.6K–J–1/4 CT–27XF12CTC
R905	ERDS2TJ271	RES,C 270–J–1/4 CT–27XF12CTC
R906	ERDS2TJ102	RES,C 1K–J–1/4 CT–27XF12CTC
R908	ERDS2TJ272	RES,C 2.7K–J–1/4 CT–27XF12CTC
R909	ERDS2TJ272	RES,C 2.7K–J–1/4 CT–27XF12CTC
R913	ERDS2TJ152	RES,C 1.5K–J–1/4 CT–27XF12CTC
R951	ERDS2TJ102	RES,C 1K–J–1/4 CT–27XF12CTC
R952	ERDS2TJ223	RES,C 22K–J–1/4 CT–27XF12CTC
R953	ERDS2TJ272	RES,C 2.7K–J–1/4 CT–27XF12CTC
R954	ERDS2TJ182	RES,C 1.8K–J–1/4 CT–27XF12CTC
R955	ERDS2TJ330	RES,C 33–J–1/4 CT–27XF12CTC
R956	ERDS2TJ241	RES,C 240–J–1/4 CT–27XF12CTC
R960	ERQ14AJ100	RES,F 10–J–1/4 CT–27XF12CTC
R961	**ERQ1CJP331**	**RES,F 330–J–1W** **CT–27XF12CTC**
R962	ERDS2TJ470	RES,C 47–J–1/4 CT–27XF12CTC
R963	ERDS2TJ470	RES,C 47–J–1/4 CT–27XF12CTC
R964	ERDS2TJ471	RES,C 470–J–1/4 CT–27XF12CTC
R965	ERDS2TJ563	RES,C 56K–J–1/4 CT–27XF12CTC
R966	ERDS1FJ471	RES,C 470–J–1/2 CT–27XF12CTC
R967	ERDS2TJ563	RES,C 56K–J–1/4 CT–27XF12CTC
R968	ERDS2TJ471	RES,C 470–J–1/4 CT–27XF12CTC
R969	ERDS2TJ390	RES,C 39–J–1/4 CT–27XF12CTC
R970	ERDS2TJ2R7	RES,C 2.7–J–1/4 CT–27XF12CTC
R971	ERDS2TJ2R7	RES,C 2.7–J–1/4 CT–27XF12CTC
R972	ERDS2TJ390	RES,C 39–J–1/4 CT–27XF12CTC
R973	ERD25TJ680	RES,C 68–J–1/4 CT–27XF12CTC
R2201	ERJ6GEYJ512	RES,M 5.1K–J–1/10
R2202	ERJ6GEYJ112	RES,M 1.1K–J–1/10
R2203	ERJ6ENF5602	RES,M 56K–F–1/10
R2204	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R2205	ERJ6GEYJ153	RES,M 15K–J–1/10
R2206	ERJ6GEYJ823	RES,M 82K–J–1/10

REPLACEMENT PARTS LIST

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REF. NO.	PART NO.	DESCRIPTION
R2207	ERJ6GEYJ153	RES,M 15K–J–1/10
R2208	ERJ6GEYJ154	RES,M 150K–J–1/10
R2209	EVND2AA03B54	CONTROL 50K
R2210	ERJ6GEYJ134	RES,M 130K–J–1/10
R2211	ERJ6GEYJ154	RES,M 150K–J–1/10
R2212	ERJ6GEYJ302	RES,M 3K–J–1/10
R2213	EVND2AA03B54	CONTROL 50K
R2214	ERJ6GEYJ682	RES,M 6.8K–J–1/10
R2217	EVND8AA03B14	CONTROL 10K
R2220	EVND8AA03B24	CONTROL 20K
R2221	EVND8AA03B34	CONTROL 30K
R2222	ERJ6GEYJ153	RES,M 15K–J–1/10
R2223	ERJ6GEYJ393	RES,M 39K–J–1/10
R2240	ERJ6GEYJ102	RES,M 1K–J–1/10
R2241	ERJ6GEYJ102	RES,M 1K–J–1/10
R2244	ERJ6GEYJ101	RES,M 100–J–1/10
R2245	ERJ6GEYJ101	RES,M 100–J–1/10
R2247	ERJ6GEYJ474	RES,M 470K–J–1/10
R2301	ERDS2TJ102	RES,C 1K–J–1/4
R2302	ERDS2TJ102	RES,C 1K–J–1/4
R2303	ERDS2TJ392	RES,C 3.9K–J–1/4
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
R2303	ERDS2TJ512	RES,C 5.1K–J–1/4
		CT–2742SFTM
R2304	ERDS2TJ392	RES,C 3.9K–J–1/4
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
R2304	ERDS2TJ512	RES,C 5.1K–J–1/4
		CT–2742SFTM
R2305	ERD25FJ2R2	RES,C 2.2–J–1/4
R2306	ERD25FJ2R2	RES,C 2.2–J–1/4
R2307	ERDS2TJ102	RES,C 1K–J–1/4
R2308	ERDS2TJ102	RES,C 1K–J–1/4
R2310	ERDS2TJ271	RES,C 270–J–1/4
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
R2311	ERDS2TJ271	RES,C 270–J–1/4
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
R2312	ERDS2TJ103	RES,C 10K–J–1/4
R2314	ERDS2TJ182	RES,C 1.8K–J–1/4
R2315	ERDS2TJ682	RES,C 6.8K–J–1/4
R2316	ERDS2TJ331	RES,C 330–J–1/4
R2317	ERD25TJ181	RES,C 180–J–1/4
R2320	ERDS2TJ563	RES,C 56K–J–1/4
R2321	ERDS2TJ752	RES,C 7.5K–J–1/4
R2322	ERDS2TJ563	RES,C 56K–J–1/4
R2323	ERDS2TJ563	RES,C 56K–J–1/4
R2324	ERDS2TJ822	RES,C 8.2K–J–1/4
R2325	ERDS2TJ682	RES,C 6.8K–J–1/4
R2326	ERDS2TJ682	RES,C 6.8K–J–1/4
R2327	ERD25TJ203	RES,C 20K–J–1/4

REF. NO.	PART NO.	DESCRIPTION
R2328	ERDS2TJ203	RES,C 20K–J–1/4
R2329	ERDS2TJ203	RES,C 20K–J–1/4
R2340	ERDS2TJ333	RES,C 33K–J–1/4
R2341	ERDS2TJ562	RES,C 5.6K–J–1/4
R2343	ERDS2TJ102	RES,C 1K–J–1/4
R2345	ERDS2TJ223	RES,C 22K–J–1/4
R2346	ERDS2TJ682	RES,C 6.8K–J–1/4
R2351	ERDS2TJ102	RES,C 1K–J–1/4
R2352	ERDS2TJ101	RES,C 100–J–1/4
R2354	ERDS2TJ223	RES,C 22K–J–1/4
R2356	ERDS2TJ183	RES,C 18K–J–1/4
R2357	ERDS2TJ183	RES,C 18K–J–1/4
R2358	ERDS2TJ472	RES,C 4.7K–J–1/4
R2359	ERDS2TJ472	RES,C 4.7K–J–1/4
R2360	ERDS2TJ332	RES,C 3.3K–J–1/4
R2361	ERDS2TJ332	RES,C 3.3K–J–1/4
R2362	ERDS2TJ103	RES,C 10K–J–1/4
R2363	ERDS2TJ103	RES,C 10K–J–1/4
R2364	ERDS2TJ102	RES,C 1K–J–1/4
R2365	ERDS2TJ102	RES,C 1K–J–1/4
R2366	ERDS2TJ473	RES,C 47K–J–1/4
R2367	ERDS2TJ222	RES,C 2.2K–J–1/4
R2368	ERDS2TJ222	RES,C 2.2K–J–1/4
R2369	ERDS2TJ472	RES,C 4.7K–J–1/4
R2370	ERDS2TJ472	RES,C 4.7K–J–1/4
R2371	ERDS2TJ473	RES,C 47K–J–1/4
R2381	ERJ6GEYJ225	RES,M 2.2MEG–J–1/10
R2382	ERJ6GEYJ153	RES,M 15K–J–1/10
R2383	ERJ6GEYJ333	RES,M 33K–J–1/10
R2387	ERDS2TJ102	RES,C 1K–J–1/4
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
R3005	ERJ6GEYJ184	RES,M 180K–J–1/10
R3006	ERJ6GEYJ184	RES,M 180K–J–1/10
R3007	ERJ6GEYJ184	RES,M 180K–J–1/10
R3008	ERJ6GEYJ184	RES,M 180K–J–1/10
R3009	ERJ6GEYJ750	RES,M 75–J–1/10
R3010	ERJ6GEYJ750	RES,M 75–J–1/10
R3011	ERJ6GEYJ102	RES,M 1K–J–1/10
R3012	ERJ6GEYJ102	RES,M 1K–J–1/10
R3013	ERJ6GEYJ102	RES,M 1K–J–1/10
R3014	ERJ6GEYJ102	RES,M 1K–J–1/10
R3015	ERJ6GEYJ102	RES,M 1K–J–1/10
R3016	ERJ6GEYJ102	RES,M 1K–J–1/10
R3017	ERJ6GEYJ102	RES,M 1K–J–1/10
R3018	ERJ6GEYJ101	RES,M 100–J–1/10
R3019	ERJ6GEYJ101	RES,M 100–J–1/10
R3020	ERJ6GEYJ101	RES,M 100–J–1/10
R3021	ERJ6GEYJ102	RES,M 1K–J–1/10
R3022	ERJ6GEYJ750	RES,M 75–J–1/10
R3023	ERJ6GEYJ101	RES,M 100–J–1/10
R3024	ERJ6GEYJ101	RES,M 100–J–1/10
R3025	ERDS2TJ101	RES,C 100–J–1/4
R3026	ERD25TJ101	RES,C 100–J–1/4
R3028	ERJ6GEYJ101	RES,M 100–J–1/10

REPLACEMENT PARTS LIST

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R3039	ERJ6GEYJ271	RES,M 270–J–1/10
R3040	ERJ6GEYJ820	RES,M 82–J–1/10
R3042	ERJ6GEYJ221	RES,M 220–J–1/10
R3051	ERJ6GEYJ102	RES,M 1K–J–1/10
R3053	ERJ6GEYJ562	RES,M 5.6K–J–1/10
R3054	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R3055	ERJ6GEYJ102	RES,M 1K–J–1/10
R3056	ERJ6GEYJ102	RES,M 1K–J–1/10
R3057	ERJ6GEYJ102	RES,M 1K–J–1/10
R3058	ERJ6GEYJ122	RES,M 1.2K–J–1/10
R3060	ERJ6GEYJ333	RES,M 33K–J–1/10
R3061	ERJ6GEYJ103	RES,M 10K–J–1/10
R3062	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R3066	ERJ6GEYJ431	RES,M 430–J–1/10
R3201	ERJ6GEYJ103	RES,M 10K–J–1/10
R3202	ERJ6GEYJ223	RES,M 22K–J–1/10
R3203	ERJ6GEYJ101	RES,M 100–J–1/10
R3204	ERJ6GEYJ102	RES,M 1K–J–1/10
R3205	ERJ6GEYJ682	RES,M 6.8K–J–1/10
R3206	ERJ6GEYJ272	RES,M 2.7K–J–1/10
R3207	ERJ6GEYJ103	RES,M 10K–J–1/10
R3208	ERJ6GEYJ102	RES,M 1K–J–1/10
R3209	ERJ6GEYJ102	RES,M 1K–J–1/10
R3210	ERJ6GEYJ103	RES,M 10K–J–1/10
R3215	EVND8AA03B22	CONTROL 200 OHM
R3216	ERJ6GEYJ331	RES,M 330–J–1/10
R3217	ERJ6GEYJ331	RES,M 330–J–1/10
R3218	ERJ6GEYJ102	RES,M 1K–J–1/10
R3219	ERJ6GEYJ151	RES,M 150–J–1/10
R3220	ERJ6GEYJ152	RES,M 1.5K–J–1/10
R3224	ERJ6GEYJ152	RES,M 1.5K–J–1/10
R3225	ERJ6GEYJ152	RES,M 1.5K–J–1/10
R3226	ERJ6GEYJ182	RES,M 1.8K–J–1/10
R3232	ERJ6GEYJ221	RES,M 220–J–1/10
R3233	ERJ6GEYJ102	RES,M 1K–J–1/10
R3234	ERJ6GEYJ621	RES,M 620–J–1/10
R3236	ERJ6GEYJ103	RES,M 10K–J–1/10
R3237	ERJ6GEYJ103	RES,M 10K–J–1/10
R3238	ERJ6GEYJ121	RES,M 120–J–1/10
R3239	ERJ6GEYJ223	RES,M 22K–J–1/10
R3240	ERJ6GEYJ473	RES,M 47K–J–1/10
R3241	ERJ6GEYJ331	RES,M 330–J–1/10
R3242	ERJ6GEYJ103	RES,M 10K–J–1/10
R3243	ERJ6GEYJ331	RES,M 330–J–1/10
R3251	ERJ6GEYJ471	RES,M 470–J–1/10
R3252	ERJ6GEYJ103	RES,M 10K–J–1/10
R3253	ERJ6GEYJ152	RES,M 1.5K–J–1/10
R3254	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R3256	ERJ6GEYJ391	RES,M 390–J–1/10
R3257	ERJ6GEYJ271	RES,M 270–J–1/10
R3258	ERJ6GEYJ561	RES,M 560–J–1/10
R3259	ERJ6GEYJ151	RES,M 150–J–1/10
R3260	ERJ6GEYJ101	RES,M 100–J–1/10
R3261	ERJ6GEYJ162	RES,M 1.6K–J–1/10
R3262	ERJ6GEYJ104	RES,M 100K–J–1/10
R3263	ERJ6GEYJ331	RES,M 330–J–1/10

REF. NO.	PART NO.	DESCRIPTION
R3264	ERJ6GEYJ103	RES,M 10K–J–1/10
R3265	ERJ6GEYJ223	RES,M 22K–J–1/10
R3266	ERJ6GEYJ223	RES,M 22K–J–1/10
R3267	ERJ6GEYJ473	RES,M 47K–J–1/10
R3268	ERJ6GEYJ103	RES,M 10K–J–1/10
R3269	ERJ6GEYJ103	RES,M 10K–J–1/10
R3270	ERJ6GEYJ222	RES,M 2.2K–J–1/10
R3271	ERJ6GEYJ103	RES,M 10K–J–1/10
R3290	ERDS2TJ561	RES,C 560–J–1/4
R3291	ERDS2TJ182	RES,C 1.8K–J–1/4
R3293	ERDS2TJ391	RES,C 390–J–1/4
R3294	ERDS2TJ101	RES,C 100–J–1/4
		SWITCHES
S010	EVQQVC13T	SWITCH
S011	EVQQVC13T	SWITCH
S012	EVQQVC13T	SWITCH
S013	EVQQVC13T	SWITCH
S014	EVQQVC13T	SWITCH
S015	EVQQVC13T	SWITCH
S016	EVQQVC13T	SWITCH
		TRANSFORMERS
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**ETH19Y70AYM**	**TRANSFORMER, HORIZONTAL DRIVER**
T551	**0LF04507F1**	**TRANSFORMER, FLYBACK**
T771	**ETR26L32A**	**TOP AND BOTTOM TRANSFORMER**
T801	**ETS39AG135AC**	**TRANSFORMER**
		CRYSTALS/FILTERS
X001	TSS2080MX	CRYSTAL, 12 MHZ CLOCK
X101	EFCH45MSP6N	SAW FILTER
X102	EFCWS4504AB	FILTER
X201	EFCS4R5MS4W	FILTER 4.5MHZ BANDPASS
X501	TAFCSB503F38	CRYSTAL, CLOCK
X601	TSS816MX	CRYSTAL 3.58MHZ OSCILLATOR
		OTHERS
RM001	RPM–637CBRL	RECEIVER, REMOTE CONTROL
TNR001	**ENV568N5G3**	**TUNER**
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M001	M68KTY161XF	CRT, 27"
M002	EAGG1213A2	SPEAKER
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
M003	EAGG1213C2	ASSY., SPEAKER
		CT–27XF12CTC
M004	EAG1202KD–G	ASSY., SPEAKER
		CT–2742SFTM
M005	EUR501224	TRANSMITTER, REMOTE CTRL
M006	TBM2A30831	BADGE, PANASONIC
		CT–2742SFTM
M007	TBM2A30841	BADGE, PANASONIC
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M008	TBX2A50191G	ASSY. 7 PUSHBUTTON

REPLACEMENT PARTS LIST

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF. NO.	PART NO.	DESCRIPTION
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M009	TEK6935	DOOR, CATCH
		CT–2742SFTM
M010	TES2A20312	SPRING, DAG GROUND
M011	**TJS1A5211**	**SOCKET, CRT**
M012	TKN2A91722	ASSY., SPKR GRILLE
		CT–2742SFTM
M013	TKP2A12021	PANEL: CHNL/PWR/VOL
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M014	TKP2A12031	PANEL: SMOKE I/R RCVR
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M015	TKP2A50711–1	DOOR, CONTROL
		CT–2742SFTM
M016	TLC2047–2	MAGNET,RINGS:PURITY &
		STATIC CONV.
		CT–2742SFTM CT–27SF12TM
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M017	TMM2A10803	SPACER, LED
		CT–2742SFTM
M018	TMM2A14001	LED/INFRA–RED HOLDER
		CT–27SF12TM CT–27XF12CTC
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M019	TMM2A30701	WEDGE, YOKE
M020	TMW2A97121	STRAIN RELIEF: AC LINE CORD
M021	TQB2A0902	MANUAL, OWNER'S (SPANISH)

REF. NO.	PART NO.	DESCRIPTION
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
M022	TQB2A0910	MANUAL, OWNER'S
		CT–27SF12TM CT–F29L7TM
		CT–F29L7VTM CT–F29L7LTM
M023	TQB2A0911	MANUAL, OWNER'S
		CT–27XF12CTC
M024	**TSX3134X**	**AC LINE CORD**
M025	TXFKU0294SER	ASSY, CABINET BACK
		CT–2742SFTM
M026	TXFKY0294SER	ASSY, CABINET FRONT
		CT–2742SFTM
M027	TXFKY0894SER	ASSY, CABINET FRONT
		CT–F29L7VTM CT–F29L7TM
		CT–F29L7LTM CT–27SF12TM
M028	TXFKU2093SER	ASSY, CABINET BACK
		CT–F29L7VTM CT–F29L7TM
		CT–F29L7LTM CT–27SF12TM
M029	TKFKU3294SER	ASSY, CABINET BACK
		CT–27XF12CTC
M030	TKFKY1794SER	ASSY, CABINET FRONT
		CT–27XF12CTC
M031	TXFMK01H55	CONVERGENCE CORRECTOR STRIP
		CT–27XF12CTC
M032	TXF3A01ZER	ASSY. DAG GROUND
M033	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
		CT–2742SFTM CT–27SF12TM
		CT–F29L7TM CT–F29L7VTM
		CT–F29L7LTM
JK3001	TJB2A9051–1	TERMINAL BOARD
M034	T8A262	SILICONE GREASE–HEAT SINK
		COMPOUND

DESCRIPTION OF ABBREVIATIONS GUIDE

RESISTOR			
TYPE		ALLOWANCE	
C	Carbon	F	+/– 1%
F	Fuse	J	+/– 5%
M	Metal Oxide	K	+/– 10%
S	Solid	M	+/– 20%
W	Wire Wound	G	+/– 2%

RES, C 270–J–1/4

CAPACITOR			
TYPE		ALLOWANCE	
C	Ceramic	C	+/– 0.25pF
E	Electrolytic	D	+/– 0.5pF
P	Polyester	F	+/– 1pF
S	Styrol	J	+/– 5%
T	Tantalum	K	+/– 10%
		L	+/– 15%
		M	+/– 20%
		P	+100% –0%
		Z	+80% –20%

CAP, P .068UF–K–50V

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